HANDBOOK
OF
ACCEPTED REMEDIES, SYMPTOMS AND TREATMENT OF POISONING, DIAGNOSTIC PROCEDURES
AND
MISCELLANEOUS INFORMATION

1936

DEPARTMENT OF PUBLIC HEALTH
COUNTY OF SAN FRANCISCO,
CALIFORNIA

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REFERENCE BOOK

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OF
ACCEPTED REMEDIES, SYMPTOMS AND TREATMENT OF POISONING, DIAGNOSTIC PROCEDURES
AND
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1936

Edited by
P. J. Hanzlik, M. D.

DEPARTMENT OF PUBLIC HEALTH
CITY AND COUNTY OF SAN FRANCISCO,
CALIFORNIA

THE USE IN THIS VOLUME OF CERTAIN PORTIONS OF THE TEXT OF THE UNITED STATES PHARMACOPOEIA, IS BY VIRTUE OF PERMISSION RECEIVED FROM THE BOARD OF TRUSTEES OF THE UNITED STATES PHARMACOPOEIAL CONVENTION. THE SAID BOARD OF TRUSTEES IS NOT RESPONSIBLE FOR ANY INACCURACY OF QUOTATION NOR FOR ANY ERRORS IN THE STATEMENT OF QUANTITIES OR PERCENTAGE OF STRENGTHS.

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PREFACE

The publication of this "Handbook of Accepted Remedies, Symptoms and Treatment of Poisoning, Diagnostic Procedures, and Miscellaneous Information, brings to the Director of Public Health no little pleasure and genuine satisfaction. The very real need for such a manual, particularly among the members of the Resident and Visiting Staffs of the San Francisco Hospital, has finally been met in tangible form, in this Handbook which, it is believed, will be found most useful.

The Handbook has been compiled, edited, and prepared for publication by the Pharmaceutical Committee, appointed by the Director of Public Health, and made up of: The Director or the George Williams Hooper Foundation, Doctor K. F. Meyer; The Professors of Pharmacology in the University of California and Stanford University Medical Schools, Doctor Chauncey D. Leake and Doctor P. J. Hanzlik, respectively; The Superintendent of the San Francisco Hospital, Doctor L. M. Wilbor; The Director of the Bureau of Communicable Diseases, Doctor George H. Becker (Chairman); A Member of the Health Advisory Board Doctor James W. Ward; and the Director of Public Health (ex officio). In the preparation of the Handbook, various representatives of the Department of Public Health and the two universities, particularly in the institutional services involving these three organizations were frequently consulted so that the Handbook would, in its final form and content, have the benefit of the advice and counsel of all interested groups.

The Director of Public Health wishes to thank the Committee as a whole, and its members individually, for their good work and to extend his appreciation to Doctor P. J. Hanzlik, particularly, because the major portion of the preparation of the Handbook was carried out by him. At the same time, the following references, which were frequently and extensively used in the compilation, should have full acknowledgement as sources of valuable data:

Hospital Practice for Internes, 1932, Useful Drugs, 9th Ed., 1930, and **New and Non-official Remedies,** 1935, Ed., published by the American Medical Association.

Accepted Dental Remedies, 1935 Ed., published by the American Dental Association.

A Manual of Pharmacology, 4th Ed., 1932, by Torald Sollmann.

An Introduction to Experimental Pharmacology, 1928, by T. Sollmann and P. J. Hanzlik.

A Text-Book of Pharmacology and Therapeutics, 1934, 10th Ed., by A. R. Cushny, revised by C. W. Edmunds and J. A. Gunn.

Clinical Toxicology, 1934, by E. Leschke, trans. by C. P. Stewart and O. Dorrer.

What to Do In Cases of Poisoning, 14th Ed., 1934, by W. Murrell, revision by P. Hamill.

A Manual of Toxicology, 13th Ed., 1921, by A. H. Brundage.

The Merck Manual of Therapeutics and Materia Medica, 6th Ed., 1934.

Outline of Symptoms and Treatment of Acute Poisoning, compiled by Professor P. J. Hanzlik (for the Department of Public Health, City and County of San Francisco).

Practical Chemical Analysis of Blood, 2nd Ed., 1934, by V. C. Myers.

A Text Book of Laboratory Diagnosis, 1934, by E. E. Osgood and H. D. Haskins.

Clinical Diagnosis of Laboratory Methods, 8th Ed., 1935, by J. C. Todd and A. H. Sanford.

Laboratory Medicine, 2nd Ed., 1934, by D. Nicholson.

J. C. Geiger, M. D.
March, 1936. *Director of Public Health.*

CONTENTS

THERAPEUTIC INDEX AND DOSES

The drugs and preparations in the following list are all official in the United States Pharmacopoeia XI (U. S. P.) except as indicated. N. F. refers to the National Formulary VI, N. N. R. to New and Non-official Remedies, and A. D. R. to Accepted Dental Remedies. Products in brackets are not official or Council-accepted, but are accepted by the Pharmaceutical Committee. Doses are average single doses. Details of methods of administering drugs may be found in "Technic of Medication" published by the American Medical Association.

ALIMENTARY CANAL

Dental

Anesthesia, Topical

Benzyl Alcohol (N.N.R.) (A.D.R.)....4 per cent
Ethyl Aminobenzoate.....10 per cent
Saligenin (A.D.R.).....10 per cent

Dentifrice

Bicarbonate, Sodium .....5 per cent
Chloride, Sodium.....5 per cent
Dentifrice (Tooth Powder) (N.F.): prepared and precipitated chalk, sweetened with saccharin, flavored with volatile oils, with the addition of soap.
Proprietary dentifrices listed in A.D.R.

Gingivitis and Stomatitis

(See **Gargles and Mouthwashes**)

Odontalgia (Tooth-ache)

Acetylsalicylic Acid, Compound Paste of (Dental Anodyne Paste) (N.F.)

Eugenol	2
Peruvian Balsam	10
Acetylsalicylic Acid	25
White Wax	10
Wool Fat q. s. ad	100

Sig: Apply locally.

Creosote.....undiluted local
Cresatin—Dr. N. Sulzberger (A.D.R.) .....undiluted local
Odontalgicum (Toothache Drops): Chlorbutanol, 2.5 per cent in oil of cloves.....local
Phenol, Aromatic (Blackwell's 1-2-3 mixture)

Phenol	20
Oil of Cinnamon	10
Methyl Salicylate	30

Sig: Apply locally.

Phenol, Liquefied .....20 per cent (local)

Vincent's Angina

Arsphenamine.....0.2
Bismuth Sodium Tartrate (N.N.R.) (A.D.R.).0.3
Bismuth Sodium Tartrate, Glycerinated (A.D.R.).....1.5 per cent
Perborate, Sodium (N.F.).....2 per cent

Oral

Antiseptics

Chlorazene Powder, Aromatic (A.D.R.) ⅛ teaspoonful in ½ glass warm water (fresh solution).
Dye Mixture (Berwick's Solution)
Gentian Violet (N.F.)...1 per cent
Brilliant Green (N.F.)..1 per cent
Alcohol.....50 per cent
Glycerin, Iodine and Potassium Iodide Mixture (Mandell's Solution)
Iodine.....0|3
Potassium Iodide.....0|6
Peppermint Oil.....0|3
Glycerin q. s. ad.....30|0
Hydrogen Peroxide, Solution of: dilute with equal parts of water
Merthiolate Solution (A.D.R.).....1:1000
Metaphen Solution (A.D.R.).....1:5000
Permanganate, Potassium.....0.1 per cent

Antisialagogue

Atropine Sulphate.....0.001
Belladonna, Tincture of.....0.2

Gargles and Mouth Washes

Alkaline Aromatic Solution (N.F.).....ad lib.
Aluminium Acetate, Solution of (N.F.)....ad lib.
Astringent Application
Tincture of Myrrh.....20|0
Tincture of Kino.....10|0
Sig: Apply to gums three or four times daily.
Borate, Compound Solution of Sodium (N.F.) ad lib.
Chlorate, Potassium.....3 to 5 per cent
Kino, Tincture of.....1:50 solution
Myrrh, Tincture of.....1:50 solution
Physiological Salt Solution.....ad lib.
Permanganate, Potassium.....0.1 per cent

Protectives and Demulcents

Acacia.....6 to 25 per cent
Glycerite of Starch.....ad lib.
Starch.....10 per cent

Sialagogue

Pilocarpine Nitrate.....0.008

Gastrointestinal

Antacid, Laxative
- Magnesium Carbonate....0.5
- Magnesium Oxide....0.5

Antacid, Non-Laxative
- Bicarbonate, Sodium....0.5
- Calcium Carbonate Precipitated....0.5
- Calcium Carbonate Compound (tablets)
  - Sodium Bicarbonate....0.5
  - Calcium Carbonate....0.5
  - Peppermint....q. s.
    (Or artificial flavor)

Antemetic (Antinauseant)
- Bismuth Subcarbonate....1.0
- Lime Water....ad lib.
- Phenobarbital....0.1

Antispasmodic
- Atropine Sulphate....0.0005
- Belladonna, Tincture of....0.5
- Papaverine Hydrochloride (N.F.)....0.05
- Nitrite, Sodium....0.06

Bitter, Stomachic
- Cinchona, Tincture of....0.5
- Gentian, Compound Tincture of....0.5
- Nux Vomica, Tincture of....0.2
- Strychnine Sulphate....0.0005

Carminative
- Peppermint, Spirit of....0.5

Cathartic and Laxative
- Agar....100.0
- Agar and Liquid Petrolatum, Emulsions of (N.N.R.)....20.0
- Aloes....0.1
- Calomel....0.06
- Cascara Sagrada, Aromatic Fluidextract of...2.0
- Castor Oil....25.0
- Effervescent, Compound Powders (Seidlitz Powder)....(a white and a blue powder)
- Licorice, Compound Powder of....4.0
- Magnesium Citrate, Solution of....250.0
- Magnesium Sulphate (Epsom Salts)....15.0
- Petrolatum, Liquid....15.0
- Petrolatum, Emulsion of Liquid....30.0
- Phenolphthalein....0.06
- Tartrate, Potassium and Sodium (Rochelle Salts)....10.0

Cholagogue
- Bile Salts (N.N.R.)....0.05
- Cinchophen (N.F.)....0.5
- Decholin (N.N.R.)....0.25
- Salicylate, Sodium....0.5

Diarrhoea (Enteritis)

Atropine Sulphate 0.0005
Bismuth Subcarbonate 0.5
Calcium Carbonate 0.5
Kaolin (N.F.) 1.0
Morphine Sulphate 0.008
Opium, Tincture of 0.3
Opium, Camphorated Tincture of (Paregoric) .4.0
Papaverine Hydrochloride (N.F.) 0.03
Tannin 0.2

Emetic

Antimony and Potassium Tartrate (Tartar Emetic) 0.01
Apomorphine Hydrochloride 0.008
Chloride, Sodium ..... 5 per cent
Ipecac 0.5
Zinc Sulphate 0.3

Gastritis, Nausea and Vomiting

Bicarbonate, Sodium 5.0
Bismuth Subcarbonate 5.0
Lime Water ..... ad lib.
Morphine Hydrochloride 0.008
Phenobarbital 0.1

Hemorrhoids (Proctitis, Piles, etc.)

Suppositories Tannic Acid Compound

Tannic Acid	0.1
Opium	0.022
Ext. Belladonna	0.008

Sig: Use as directed.

Suppositories Anesthesin Compound

Ethyl Aminobenzoate (Anesthesin) .10 per cent
Balsam Peru ..... 1 per cent
Cocoa Butter ..... q. s.
Dispense 12 suppositories.
Sig: Use as directed.

Ethyl Aminobenzoate Ointment

Ethyl Aminobenzoate 6.0
Petrolatum 30.0
Sig: Apply locally as directed.

Hyperacidity, Fermentative, etc.

Bismuth Subcarbonate 0.5
Hydrochloric Acid, Dilute 1.0
Lime Water ..... ad lib.

Hyperchlorhydria

Bicarbonate, Sodium 5.0
Calcium Carbonate 5.0
Magnesium Carbonate 5.0

Hypoacidity (Achlorhydria)
Hydrochloric Acid, Dilute....1.0

Indigestion, Anorexia, etc.
Acid Hydrochloric, Dilute....1.0
Cinchona, Tincture of....0.5
Gentian, Compound Tincture of....1.0
Nux vomica, Tincture of....0.2
Quinine Sulphate....0.002
Strychnine Sulphate....0.005

Paralytic Ileus (Intestinal Paresis)
Physostigmine Salicylate (Eserine)....0.003
Pituitary, Solution of Posterior....0.5
Procaine Hydrochloride (Spinal Anesthesia)....0.5 per cent

Worms and Infestations (Anthelmintics, Vermifuges, Vermicides, Etc.)

Hook-worm
Carbon tetrachloride....2.0
Chenopodium Oil....1.0
Thymol....2.0

Pin-worm
Ferric Chloride, Tincture of..1 per cent (rectal)
Santonin....0.06
[Spigelia, Tincture of....(rectal)]
Tannin....1 per cent (rectal)

Round-worm
[Hexylresorcinol....2.0]
Santonin....0.5

Tape-worm
Aspidium, Oleoresin of....0.5
Pelletierine Tannate....0.25

Amebiasis
Acetarsone (N.N.R.)....0.25
Carbarsone (N.N.R.)....0.25
(Retention enema, 250 cc. of 1 per cent solution in 1 per cent sodium bicarbonate)
Emetine Hydrochloride....0.02
Ipecac....0.008
Vioform (N.N.R.)....0.75

Blood

Agranulocytosis (Granulocytopenia)
Pentnucleotide (N.N.R.) 10 to 20 (hypodermic or vein)

Anemia, Pernicious
Arsenious Acid, Solution of....0.2
Arsenite, Solution of Potassium, (Fowler's Solution)....0.2

[Congo Red 4B (1 per cent in 6 per cent dextrose solution; fresh; filtered) .0.1 to 0.15 (vein)]
Liver, Extract of.....3.0
Liver, Solution or Purified Solution of .....2.0 (intramuscular)
Stomach.....20.0 (daily)
Ventriculin (N.N.R.).....20.0 (daily)

Anemia, Secondary
Cacodylate, Sodium.....0.03
Ferrous Carbonate.....0.3
Ferrous Carbonate, Mass of.....0.5
Ferrous Carbonate, Pills of (Blaud's Pills).....1.5
Iron and Ammonium Citrates, Green 0.2

Coagulant, Local
Alum.....5 per cent
Kephalin (N.N.R.).....local application
Thromboplastin (N.N.R.).....local application

Hemostatic
Alum.....5 per cent
Epinephrine Hydrochloride.....0.01 per cent
Neosynephrine Hydrochloride (N.N.R.).....0.01 per cent

Leukemia
Benzene (Benzol) (N.N.R.).....0.5
Pentnucleotide (N.N.R.) 10 to 20 (hypodermic or vein)

CIRCULATION
Cardiac Conditions

Angina Pectoris
Morphine Sulphate.....0.008
Nitrite, Amyl.....0.2
Nitroglycerin, Spirit of.....0.06

Auricular Fibrillation
Digitalis.....0.1
Digitalis, Tincture of.....1.0
Digitan (N.N.R.).....0.1
Quinidine Sulphate.....0.2
[Sparteine Sulphate.....0.1]

Bradycardia
Atropine Sulphate.....0.0005
Ephedrine Sulphate or Hydrochloride.....0.025

Coronary Occlusion (Coronary Thrombosis; Cardiac Infarction)
Caffeine with Sodium Benzoate.....0.5
Digitan (N.N.R.) (for later use).....0.1
Morphine Sulphate.....0.008
Phenobarbital.....0.1
Quinidine Sulphate.....0.2
Theobromine with Sodium Salicylate.....0.1

Decompensation and Depression
- Digitalis....0.1
- Digitalis, Tincture of....1.0
- Ouabain (N.N.R.) (emergency)....0.0005 (vein)

Edema of Cardiac Origin
- Ammonium Chloride....5.0
- Bismuth Sodium Tartrate (N.N.R.)....0.03
- Digitalis....0.1
- Merbaphen (10 per cent solution) 0.5 (hypodermic)
- Mersalyl (Salyrgan) (N.N.R) (10 per cent solution)....0.5 (intramuscular)
- Theophylline with Sodium Acetate (N.N.R.) 0.2

Stokes-Adams Syndrome
- [Barium Chloride....0.03 (vein)]

Tachycardia
- Aconite, Tincture of....0.2
- Digitalis....0.1
- Pilocarpine Nitrate....0.008
- Quinidine Sulphate....0.2

Cardio-Vascular Conditions

Hypertension
- Erythrol Tetranitrate, Diluted....0.3
- Nitrite, Sodium....0.6
- Nitroglycerin, Spirit of....0.06
- Theobromine with Sodium Salicylate....0.2

Hypotension
- Digitalis....0.2
- Digitalis, Tincture of....2.0
- Ephedrine Sulphate or Hydrochloride....0.025
- Neosynephrine Hydrochloride (N.N.R.)....0.05
- Strophanthus, Tincture of (N.F.)....1.0

Shock (Collapse)
- Ammonia, Aromatic Spirits of....1.0
- Caffeine with Sodium Benzoate....0.5
- Camphor Liniment (Camphorated Oil)....1.0
- Dextrose Solution (sterile)....5 per cent (vein)
- Digitalis....0.2
- Digitalis, Tincture of....2.0
- Digitan (N.N.R.) (ampule)...0.1 (hypodermic)
- Ephedrine Sulphate or Hydrochloride....0.025
- Epinephrine Hydrochloride (1:1000)....0.1
- Neosynephrine Hydrochloride (N.N.R.)....0.05

Vasoconstrictors
- Ephedrine Sulphate or Hydrochloride....0.025
- Epinephrine Hydrochloride (1:1000)....0.1
- Neosynephrine Hydrochloride....0.05
- Ouabain (N.N.R.) (ampule)....0.0005
- Pitressin (N.N.R.) (ampule)....0.3
- Pituitary, Solution of Posterior....0.2

Vasodilators

Amyl Nitrite....0.2
Caffeine with Sodium Benzoate....0.2
Erythrol Tetranitrate, Diluted....0.06
Nitrite, Sodium....0.1
Nitroglycerin, Spirit of....0.06
Theobromine with Sodium Salicylate....0.2
Theophylline with Sodium Acetate....0.2

DIURETICS

Circulatory Conditions with Edema (Anasarca)

Ammonium Chloride....5.0
Calomel....0.1
Digitalis....0.2
Digitalis, Tincture of....2.0
Merbaphen(10 per cent solution)0.5 (hypodermic)
Mersalyl (Salyrgan) (N.N.R.) (10 per cent solution)....0.5 (intramuscular)
Sodium Bismuth Tartrate (N.N.R.) (ampule) 2.0
Theobromine with Sodium Salicylate....0.2
Theophylline with Sodium Acetate....0.2

Intoxications, General

Acetate, Potassium....1.0
Ammonium Chloride....1.0
Caffeine with Sodium Benzoate....0.5
Dextrose....6 per cent
Physiologic Salt Solution....ad lib.
Theophylline with Sodium Acetate....0.2
Water....ad lib.

ENDOCRINE DISTURBANCES

Adrenal Cortex (Addison's Disease)

Epinephrine Hydrochloride (1:1000)....0.5
[Adrenal Cortex, Extracts of....]

Ovary

[Anterior Pituitary, Extracts of....]
Theelin (Referred to in N.N.R.)....

Pancreas, Islands of Langerhans (Diabetes Mellitus)

Insulin (N.N.R.)....determine

Parathyroid Gland

Parathyroid, Extract (N.N.R.)....0.2 to 0.4

Pituitary Gland

[Anterior Pituitary, Extracts of....]
Pitressin (N.N.R.)....0.3
Pitocin (N.N.R.)....0.3
Pituitary, Solution of Posterior....0.3
Posterior Lobe, Extracts of....1.0

Thyroid Gland

Thyroid Powder....0.03
Thyroxin....0.002

EYE

Lotion, Antiseptic

Alkaline Borate, Glycerinated Lotion of
Sodium Bicarbonate
Sodium Chloride
Boric Acid
Glycerin a. a. ..... 3|6
Water q. s. ad ..... 30|00
Sig: Apply locally.

Boric Acid ..... 4.0 per cent
Silver Nitrate ..... 0.2 to 2 per cent
Silver, Strong Protein ..... 0.25 to 1 per cent
Silver, Mild Protein ..... 10 per cent

Mydriatic

Atropine Sulphate ..... 1.0 per cent (instillation)
Ephedrine Sulphate or Hydrochloride
..... 10.0 per cent (instillation)
Epinephrine Hydrochloride
..... 0.1 per cent (subconjunctival)
Homatropine Hydrobromide
..... 2.0 per cent (instillation)
Scopolamine Hydrobromide
..... 0.2 per cent (instillation)

Myotic

Physostigmine Salicylate (Eserine)
..... 1.0 per cent (instillation)
Pilocarpine Nitrate .. 4.0 per cent (instillation)

FEVER (ANTIPYRETICS)

Acetanilide 0.2
Acetophenetidin 0.3
Acetylsalicylic Acid 0.3
Aminopyrine 0.3
Antipyrine 0.3
Cinchophen (N.F.) 0.5
Neocinchophen 0.5
Salicylate, Sodium 0.5

METABOLISM AND NUTRITION

Avitaminosis (Vitamin Deficiencies)

(See Vitamins and Vitamin Products, page 31)

Depressant

Barbital 0.3
Iodide, Sodium (Thyrotoxicosis) 0.005

Nutrient

Cod Liver Oil 15.0

Stimulant

[Dinitrophenol ..... 0.1]
Iodide, Sodium (Hyperthyroidism) 0.2
Thyroxin 0.0002

NERVOUS SYSTEM

Autonomic Nerves

Parasympathomimetic

Depressant

Atropine Sulphate.....0.0005
Homatropine Hydrobromide.....0.0001
Scopolamine Hydrobromide.....0.0002

Stimulant

Physostigmine Salicylate (Eserine).....0.002
Pilocarpine Nitrate.....0.008

Sympathomimetic

Depressant

Ergot, Fluidextract of.....2.0
Ergotamine Sulphate (Ergotoxine) (Gynergen, N.N.R.).....0.00025

Stimulant

Ephedrine Sulphate or Hydrochloride.....0.025
Epinephrine Hydrochloride.....0.0005
Neosynephrine Hydrochloride (N.N.R.).....0.05
Tyramine Hydrochloride (N.N.R.).....0.02

Central (Brain; Spinal Cord)

Analgetic (Relief of Pain)

Acetanilide.....0.2
Acetophenetidin.....0.3
Acetylsalicylic Acid.....0.3
Antipyrine.....0.3
Codeine Sulphate.....0.03
Dilaudid (N.N.R.).....0.001
Morphine Sulphate.....0.008
Papaverine Hydrochloride (N.F.) (ureteral colic).....0.04
Salicylate, Sodium.....0.5

Anesthetic, Systemic

Chloroform.....inhalation
[Cyclopropane (15 per cent).....inhalation]
Ether.....inhalation
Nitrous Oxide.....inhalation

Hypnotic (Depressant; soporific)

Alcohol.....
Barbital.....0.5
Bromide, Sodium.....1.0
Chloral Hydrate.....0.50
Brandy (Spiritus Vini Viti).....
Morphine Sulphate.....0.008
Paraldehyde.....2.0
Phenobarbital.....0.03
[Tribromethanol (Avertin).....0.09 per Kg. (note precautions)]
Whiskey (Spiritus Frumenti).....

Stimulant

Caffeine with Sodium Benzoate.....0.3
Camphor Liniment (Camphorated Oil).....1.0
[Lobeline.....0.01]
Metrazole (N.N.R.) (ampule).....1.0
Strychnine Sulphate.....0.001

Peripheral Sensory Nerves

Anesthetic, Local

Butyn (N.N.R.).....2 per cent
Cocaine Hydrochloride.....1 per cent
Ethyl Chloride.....spray
Nupercaine (N.N.R.).....0.1 per cent
Procaine Hydrochloride.....2 per cent

Anesthetic, Spinal

Procaine Hydrochloride (2 per cent).....0.5

RESPIRATION

Asthma

Atropine Sulphate.....0.0005
Calcium Lactate.....1.0
Ephedrine Sulphate or Hydrochloride.....0.05
Epinephrine Hydrochloride (1:1000).....0.0005
Iodide, Sodium.....0.2
Phenobarbital.....0.1

Bronchial Secretion, To Decrease

Atropine Sulphate.....0.0005
Hyoscyamus, Tincture of.....2.0

Bronchial Secretion, To Increase and Liquefy

Ammonium Chloride.....1.0
Ammonium Chloride, Syrup of.....
Ammonium Chloride..... 10|0
Syrup Citric Acid..... 50|0
Water ad.....100|0
Sig: One teaspoonful freely diluted with water every 2 hours.
Creosote.....0.2
Ipecac, Syrup of.....4.0
Pilocarpine Nitrate.....0.008
Iodide, Sodium.....0.2
Terpene Hydrate.....0.2

Cough (Depression of Respiratory Center)

Codeine Sulphate.....0.1
Cough Mixture
Antipyrine..... 1|6
Tincture of Belladonna.... 22|0
Syrup of Tolu q. s. ad.....120|0
Sig: Teaspoonful every 4 hours.

Cough Mixture (Sedative for children)
Phenobarbital Sodium..... 0|36
Syrup of Wild Cherry q.s.ad.90|0
Sig: Teaspoonful every 4 hours.
Terpene Hydrate and Codeine, Elixir of (N.F.).4.0
Morphine Sulphate.....0.008
Phenobarbital.....0.1

Inhalation (Bronchitis, Asthma, Etc.)
Benzoin, Compound Tincture of
.....4 cc. in 500 cc. (1 pt.) boiling water
Menthol in Solution
Menthol..... 1|5
Alcohol q. s. ad.....30|0
Sig: One teaspoonful diluted with a quart of hot water and used as an inhalation when indicated.

Nasal Spray or Application
Ephedrine, Compound Spray of (N.F.)
Ephedrine Sulphate..... 1|0
Menthol..... 0|6
Camphor..... 0|6
Oil Thyme..... 0|3
Liquid Petrolatum q. s. ad 100|0
Sig: Use as spray or drops.
Menthol, Compound Spray of (N.F.)
Menthol..... 1|0
Camphor..... 1|0
Methyl Salicylate..... 0|5
Eucalyptol..... 0|2
Light Liquid Petrolatum
q. s. ad.....100|0
Sig: Use as spray.
Menthol and Camphor Mixture in Oil
Menthol..... 0|6
Camphor..... 0|6 or
Eucalyptol..... 0|8
Liquid Petrolatum.....180|0
Sig: Use as spray or drops.
Neosynephrine Solution
Neosynephrine Hydrochloride(N.N.R.) 1|0
Physiologic Salt Solution ad.....100|0
Sig: Use as spray or drops.

Respiratory Center, Stimulation of
Ammonia, Aromatic Spirits of.....1.0
Caffeine Citrate.....0.5
Caffeine with Sodium Benzoate.....0.2
Camphor Liniment (Camphorated Oil).....1.0
[Carbon Dioxide (5 per cent) and
Oxygen (95 per cent).....inhalation]
Metrazole (ampules).....1.0 (intramuscular)
Oxygen.....inhalation

SKIN AND MUCOUS MEMBRANES

Acne

Lotion (Epstein)

Mercuric Chloride	0	18
Resorcin	6	0
Boric Acid	10	0
Brandy	60	0
Witch Hazel q. s. ad	500	0

Sig: Apply locally.

Ointment of Kaolin and Zinc

Sulphur	6	0
Kaolin	6	0
Ointment of Zinc Oxide q. s. ad	60	0

Sig: Apply locally and rub in well.

Actinomycosis

Iodine, Compound Solution of.....10 per cent
Iodide, Sodium.....3.0 (in milk or other fluid)

Astringents (Hemostasis, Hyperidrosis, Dermatitis Venenata, Intertrigo)

Alum.....5 per cent
Aluminum Subacetate, Solution of (N.F.).ad lib.
Silver Nitrate.....2 per cent
Tannin (Tannic Acid).....5 per cent

Antiseptics, General

Alcohol.—Reliance upon alcohol for disinfection is not sound practice. It may serve as a solvent to prepare the way for the use of other agents. **It is virtually ineffective at any concentration under 70 per cent.** In this strength disinfection may be accomplished, without certainty, in 60 minutes. Wholly ineffective on spores. More than ordinarily effective with the tubercle bacillus.

Clorinated Lime (reagent, U.S.P.)—Unstable, but, used fresh in 1 to 5 per cent solution, is highly effective against ordinary bacteria in less than five minutes. A strong bleaching agent. **Not to be used on tissues in concentrations higher than 1 per cent.**

Cresol, Saponated Solution of (Lysol).—In concentrations as low as 1 per cent usually kills bacteria in less than 5 minutes, may be used as 1 to 5 per cent. Ten minutes with 5 per cent should accomplish disinfection in all ordinary circumstances. A very fair disinfectant, for general use. **Not to be used as tissue antiseptic.** Satisfactory for disinfection of surgical instruments after use, but not satisfactory for sterilization of such, unless used for 10 hours to a

day in concentrations of 40 to 50 per cent (to kill spores); for other purposes, not over 5 per cent may be used in concentrations of from 1 to 5 per cent.

Formaldehyde (Formalin).—Varies in formaldehyde concentration, but not over a wide range as purchased (35 to 40 per cent). For ordinary bacteria, use 15 per cent formaldehyde or higher for longer than 10 minutes. If given 24 hours, may be used in low concentrations, even as low as 1 per cent. Should not be used for spores. Should not be used on tissues in concentrations higher than 1 per cent.

Iodine, Tincture.—Still the best in its class for local disinfection, when tolerated. Kills ordinary types of bacteria under usual conditions often in less than one minute. Uncertain with spores. Dilute for application to mucous membranes.

Mercuric Chloride.—Usually used as 1:1000 (0.1 per cent) strength in water. Addition of a little hydrochloric acid increases the efficiency materially. Should not be used on metals, at any time. Ineffective in the presence of an excess of protein (sputum, stools, etc.) Appears to kill in less than 5 minutes, often less than 2 minutes, but, if neutralized, organisms are found still living up to 30 minutes. Organisms thus are really inactivated rather than killed, and might be infective if articles thus disinfected were placed in a suitable environment for infection, quickly. Unsuited for spores unless used for over-night soaking. **Not to be used on tissues.**

Permanganate, Potassium.—Should be used in not less than 0.5 per cent strength and preferably 1 per cent or even stronger. Kills ordinary bacteria in less than 5 minutes. Uncertain with spores.

Phenol (Carbolic Acid).—Should ordinarily be used in 2 to 5 per cent strength; kills ordinary types of bacteria in less than 5 minutes. Under ordinary conditions, should kill in less than 15 minutes with 1 per cent. Should never be used where dilution brings below 1 per cent. Can not be made into dilution more than 5 per cent and should not be used for spores. **Tricresol** is similar.

Silver Nitrate.—Kills pyogenic cocci often in less than 5 minutes, at 1:1000 (0.1 per cent), but reliable where indicated in 1 per cent. Should

not rely on it for spores. **Danger of permanent staining of tissues with repeated application.**

Soap, White (Castile).—With warm water, good lather, time, and careful scrubbing has combined detergent and disinfecting action; superior to chemical disinfecting of other kinds, where indicated. "Germicidal" soaps ordinarily found to be less efficient than white soaps. Liniment of soft soap (Tincture of Green Soap) may be used.

Antiseptics and Disinfectants, Miscellaneous (for skin and mucosa)

Antiseptic Powder

Ammoniated Mercury	0	6
Boric Acid	4	0
Talcum q. s. ad	120	0

Sig: Apply locally.

Boric Acid.....4 per cent
Boric Acid Ointment.....10 per cent
Chloramine—T.....2 per cent
Dichloramine—T.....2 per cent
Hypochlorite, Diluted Solution of Sodium
.....0.45 per cent (free chlorine)
Silver, Mild Protein.....10 per cent
Silver, Strong Protein.....1 per cent

Burns

Paraffin Dressing (Eloesser).....local
Paraffin Dressing (N.N.R.).....local
Petrolatum, Liquid.....local
Tannin.....5 to 10 per cent; local

Caustics

[Barium Sulphide (depilatory).....saturated]
Chromium Trioxide.....10 per cent
Salicylic Acid (in collodion).....20 per cent
Silver Nitrate.....10 per cent

Corns, Warts, etc.

Corns

Collodion Mixture, Salicylic

Salicylic Acid	4	0
Cannabis Indica	0	3
Collodion	15	0

Sig: Apply locally and cover with cotton and adhesive until corn softens and can be removed immediately.

Warts

Nitric Acid (concentrated).....local
Silver Nitrate.....5 per cent

Counterirritant

Mustard Oil Liniment

Oil of Mustard	4 | 0
Oil of Wintergreen	60 | 0
Cotton Seed Oil q. s. ad.	500 | 0

Sig: Apply locally.

Nipple Tenderness

Cream of Benzoin Compound

Hydrous Wool Fat	72 per cent
Olive Oil	25 per cent
Tincture of Benzoin Compound	3 per cent

Sig: Apply locally.

Parasitic Skin Diseases (Pediculosis, Ringworm, Scabies, Sycosis, Impetigo, Intertrigo)

Ammoniated Mercury Ointment (Impetigo)

White Wax	2 | 5
Ammoniated Mercury	5 | 0
Wool Fat	2 | 5
White Petrolatum q. s. ad.	50 | 0

Sig: Apply locally.

Ammoniated Mercury, Diluted Ointment (Impetigo)

Ammoniated Mercury Ointment (U.S.P.)	12 | 0
Rose Water Ointment (U.S P.) q. s. ad.	30 | 0

Sig: Apply locally.

Balsam Peru	local
Betanaphthol	5 to 10 per cent
Chrysarobin Ointment	local

Compound Coal Tar Ointment

Crude Coal Tar	2 | 0
Zinc Oxide	2 | 0
Starch	16 | 0
Petrolatum	16 | 0

Sig: Apply locally.

Iodine Ointment	local
Iodine, Tincture of	local
Iodine, Mild Tincture of	local
Mercuric Chloride	0.01 per cent
Mercurial Mild Ointment	local
Resorcin Ointment	local

Resorcin, Mild Paste of (N.F.)

Resorcin	10 | 0
Zinc Oxide	25 | 0
Starch	25 | 0
Petrolatum	40 | 0

Sig: Apply locally.

Sulphur Ointment	local

Sulphur Salicylic Ointment (Ringworm)

Salicylic Acid	0 6
Precipitated Sulphur	1 3
Rose Water Ointment q. s. ad	30 0

Sig: Apply locally.

Sulphur Ointment, Diluted (Scabies)

Sulphur Ointment (U.S.P.).	40 0
Wool Fat q. s. ad	120 0

Sig: Apply locally.

Thymol (fungicide) ..... 1 per cent (in alcohol)

White Lotion, Modified

Sulphurated Potash	4 0
Zinc Sulphate	4 0
Rose Water q. s. ad	20 0

Sig: Apply locally.

Yellow Mercuric Oxide Ointment ..... local

Protectives (Dermatitis, Insect Bites, etc.)

Benzoic Acid, Compound Ointment of (N.F.) local

Benzoic and Salicylic Ointment (Ringworm)

Benzoic Acid	1 0
Salicylic Acid	2 0
Benzoinated Lard q. s. ad	30 0

Sig: Apply locally.

[Benzoyl Peroxide Ointment ..... 10 per cent]

Calamine Lotion (N.F.)

Calamine	8 0
Zinc Oxide	8 0
Glycerin	2 0
Lime Water q. s. ad	100 0

Sig: Apply locally.

Calamine Lotion (N.F.), Modified Compound

Calamine	10 0
Zinc Oxide	8 0
Liquefied Phenol	2 0
Glycerin	12 0
Water q. s. ad	120 0

Sig: Apply locally.

Calamine Lotion (Dodd) Modified Compound

Phenol	29 to 60 0
Zinc Oxide	230 0
Glycerin	60 0
Lime Water q. s. ad	4000 0

Sig: Apply locally.

Calamine Lotion with Starch, Compound

Phenol	2 4
Starch	60 0
Zinc Oxide	60 0
Glycerin	60 0
Lime Water	60 0

Sig: Apply locally.

Collodion.....local
Collodion, Flexible.....local
Kaolin (N.F.).....local
Lime Liniment.....local
Lime Liniment, Modified
Olive Oil
Lime Water a. a. .....120|0
Sig: Apply locally.
Petrolatum, Liquid.....local
Talcum.....local
Zinc Oxide.....local
Zinc Oxide and Gelatin, Glycerinated (Unna's Paste)
Zinc Oxide.....100|0
Gelatin.....100|0
Glycerin.....250|0
Water.....250|0
Sig: Apply locally.
Zinc Oxide Ointment.....local
Zinc Oxide, Paste of (Lassar's Plain Zinc Paste)
Zinc Oxide..... 25|0
Starch..... 25|0
White Petrolatum q. s. ad..100|0
Sig: Apply locally.
Zinc Oxide with Salicylic Acid (Lassar's Paste with Salicylic Acid) (eczema)
Salicylic Acid..... 2|0
Zinc Oxide, Paste of (Lassar's) q. s. ad.....100|0
Sig: Apply locally.

Pruritus

Alcohol.....95 per cent
Aluminum Acetate, Solution of (N.F.)....ad lib.
Benzyl Alcohol (N.N.R.).....4.0 per cent
Calamine Lotion (N.F.).....ad lib.
Calamine Powder, Compound
Menthol..... 0|15
Calamine..... 8|0
Zinc Oxide..... 8|0
Talcum q. s. ad.....30|0
Sig: Apply locally.
Epinephrine Hydrochloride, Solution of (1:1000) (urticaria).....0.5 (injection)
Ethyl Aminobenzoate (dusting powder).....25 per cent (in talcum)
Ferric Chloride, Tincture of.....1.0 per cent
Menthol.....1.0 per cent (in alcohol)
Phenol.....0.5 per cent
Resorcin.....0.5 per cent
Tannin.....5.0 per cent

SPECIFIC DISEASES

Diabetes Insipidus

Antipyrine.....0.5
Pituitary, Solution of Posterior.....1.0

Gout

Cinchophen (N.F.).....0.5
Neocinchophen.....1.0
Salicylate, Sodium (full therapeutic dose 10 Gm.).....1.0

Leprosy

Chaulmoogra Oil.....0.25
Ethyl Chaulmoograte.....1.0

Malaria

[Atabrine (Atebrine).....0.1]
[Plasmochine.....0.1]
Quinine Hydrochloride.....0.5
Quinine Sulphate.....0.5

Neurosyphilis (See also Syphilis)

[Malaria (plasmodium vivax).....inoculation]
Tryparsamide (N.N.R.).....0.2

Rheumatic Fever

Acetylsalicylic Acid.....0.3
Cinchophen (N.F.).....0.5
Neocinchophen.....1.0
Sodium Salicylate.....0.5

Syphilis

Arsphenamine.....0.2
Bismuth Salicylate (Ampules, N.N.R.).....0.13
Bismuth Sodium Tartrate (N.N.R.).....11.5
Bismuth Sodium Thioglycocollate (Thiobismol) (N.N.R.).....0.2
Iodide, Sodium.....0.3
Iodobismitol (N.N.R.).....2.0
Iodomercuriate, Potassium (Potassium Mercuric Iodide).....0.01
Mercurial Ointment, Mild.....local
Mercurial Ointment, Strong.....local
Mercury Salicylate.....0.06
Neoarsphenamine.....0.3
Iodomercuriate, Syrup of Potassium (Potassium Mercuric Iodide Syrup)

Mercuric Chloride.....	0	09
Potassium Iodide.....	16	0
Compound Syrup of Sarsaparilla (N.F.) q. s. ad...	180	0

Sig: Teaspoonful three times daily.

SURGICAL APPLICATIONS AND DRESSINGS (WOUNDS, ULCERS, FISTULAS, ETC.)

Bismuth Subcarbonate Paste

Bismuth subcarbonate...1 part
Petrolatum.....2 parts
Sig: Apply locally.

Bismuth, Paste of (N.F.) (Beck)

Bismuth Subnitrate..... 30|0
White Wax..... 5|0
Paraffin..... 5|0
White Petrolatum q. s. ad.100|0
Sig: Apply locally.

Compresses

Boric Acid.....4 per cent
Solution of Aluminum Acetate (N.F.) (varying dilutions).....local

Paraffin Dressing (Eloesser)

Paraffin (m.p. 52° C)..... 50|0
Bismuth Subcarbonate.... 10|0
Vioform (N.N.R.)..... 2|0
Sig: Apply locally.

Paraffin Dressing (N.F.).....local

Silver Nitrate Ointment (Eloesser)

Silver Nitrate.....1 per cent
Balsam Peru.....10 per cent
Hydrous Wool Fat
Petrolatum a.a. q. s.
Sig: Apply locally.

URINARY SYSTEM

Acidity of Urine, To Increase

Ammonium Chloride.....1.0
Hydrochloric Acid, Dilute.....1.0
Phosphate, Monosodium (NaH_2PO_4).....1.0

Acidity of Urine, To Decrease (Make Alkaline)

Acetate, Sodium.....1.0
Bicarbonate, Sodium.....1.0
Citrate, Sodium.....1.0

Antiseptics, Urinary (Cystitis)

Methenamine.....0.5
Methylene Blue (Methylthionine Hydrochloride).....0.1
Sandalwood Oil.....0.5

Bladder Atony

Physostigmine Salicylate (Eserine).....0.002
Pituitary, Solution of Posterior.....0.2

Bladder, Irritation of

Hyoscyamus—Citrate Mixture

Potassium Citrate	30 | 0
Tincture of Hyoscyamus	30 | 0
Water q. s. ad	180 | 0

Sig: One teaspoonful as needed.

Enuresis (Bed-wetting; Urinary Incontinence)

Atropine Sulphate.....0.0005

Urine Flow, To Increase

(See **Diuretics**, page 12)

UTERUS

Amenorrhea

[Anterior Pituitary, Extracts of.....]

[Theelin (Referred to in N.N.R.).....]

Analgesia During Labor

Amytal (N.N.R.).....0.2

Barbital.....0.5

Morphine (0.008) and Scopolamine (0.0002).

Morphine Sulphate.....0.008

Nitrous Oxide—Oxygen.....inhalation

Paraldehyde.....10.0 (rectal)

Dysmenorrhea (painful menstruation)

Aminopyrine.....0.3

Aminopyrine Compound

Aminopyrine	0 | 1
Barbital Sodium	0 | 2

Sig: One such powder (capsule) every 4 hours.

Hyoscyamus, Tincture of.....2.0

Phenobarbital.....0.1

Hemorrhage, Postpartum

Ergot, Fluidextract of.....2.0

Pitocin (N.N.R.) (ampules).....0.5

Pituitary, Solution of Posterior.....0.2

Inertia in Labor (Oxytocics)

Pitocin (N.N.R.) (ampules).....0.5

Pituitary, Solution of Posterior.....0.2

Quinine Sulphate.....0.1

Menopause Symptoms

[Theelin (discussion N.N.R.).....]

Vaginal Lubricant

Tragacanth, Compound Glycerite of

Powdered Tragacanth	89 | 0
Glycerin	800 | 0
Mercury Oxycyanide	4 | 8
Water q. s. ad	4000 | 0

Sig: Use locally.

VACCINES AND SERUMS

Use and Administration

Biologic products are employed to produce passive immunity to, or to aid therapeutically in the course of, a disease. They are administered subcutaneously, intramuscularly, intraspinally or intravenously. In the latter, always give serum by phleboclysis in dextrose solution (5 per cent). In order to prevent accidents from hypersensitiveness to horse serum, test for allergy as follows: 0.05 cc. of serum diluted 1:10 in physiologic salt solution intracutaneously (Mackenzie and Hanger: Jour. Am. Med. Assoc., 1930, 94:260).

When the indications enjoin caution, an attempt should be made to desensitize the patient before giving the greater part of the dose. The method of desensitization is based on (1) partition of the dose, and (2) **slow administration of the serum.** If the skin test is positive, it is advisable to give not more than 0.1 cc. of the serum subcutaneously and to double this amount every 30 minutes till 1 cc. in all is given. After a lapse of 30 minutes, 0.1 cc. should be given intravenously and then the amount doubled every 20 minutes until the full dose is administered. If allergic symptoms appear during the intravenous administration, the previous dose should be repeated. The intravenous doses may be diluted with warm physiologic salt solution and should be given very slowly. A hypodermic injection of 1/150 to 1/100 grain (0.4 to 0.6 mgm.) of atropine may be administered beforehand, or of epinephrine (adrenaline) (1:1000) should be kept ready for use if symptoms should appear when 5 to 10 minims (0.3 to 0 6 cc.) may be given, and repeated, if necessary. In the event of grave symptoms, 1 cc. of epinephrine solution may be injected directly into the heart. After iodine has been applied to the skin, the needle should be inserted at the upper margin of the fifth rib just to the left of the sternum. When the posterior edge of the sternum is reached, the point is turned toward the midline and pushed into the heart. If artificial respiration is being used, the needle should be inserted during the expiratory phase.

Vaccines

Rabies.—Rabies Vaccine. A non-virulent preparation of the virus of rabies. **Prompt** administration of the vaccine after a bite establishes immunity before the incubation period is completed. Dosage: Each daily dose is ordinarily supplied

in separate containers and should be injected subcutaneously, usually over the anterior abdominal wall. In mild bites, fourteen, and in severe bites, twenty-one daily injections are given.

Smallpox.—Smallpox Vaccine. Material from the skin eruptions of calves having vaccinia, prepared under aseptic conditions. It is used as a prophylactic against smallpox. It should be kept cold and applied according to one of the accepted methods. A suitable dressing may be used

Typhoid.—Typhoid-Paratyphoid Combined Vaccine. This vaccine is used in the prevention of typhoid and para-typhoid. The immunity may last from two to four years. In typhoid it probably has no beneficial effect. Dosage: The first injection, about 1,000 million mixed killed bacteria, injected subcutaneously; the second injection, seven to ten days later, 2,000 million killed bacteria, and the third, from seven to ten days after the second, the same amount as the second injection.

Serums

Anthrax.—Anti-Anthrax Serum (N.N.R.). Intravenous or intramuscular administration of from 40 to 200 cc. of antiserum according to site of pustule and source of infection; as early as possible and repeated several times a day in severe cases.

Botulism.—50 to 100 cc., of Types A and B mixture when toxin type is unknown or 100 cc. of the specific antitoxin when type has been established. Either intravenously or intramuscularly. Repeat on second day, same dosage.

Diphtheria.—Diphtheria Antitoxin (Purified Anti-diphtheritic Serum).

Curative.—Intravenous (Caution!) Intramuscular, or in children intraperitoneal, administration of 10,000 to 50,000 antitoxic units early. (Average dose, 20,000 units for the average patient; repeat once within 24 to 48 hours).

Preventive Immunization:

Diphtheria—Toxin-Antitoxin Mixture (N.F.).—0.1 L ++ Antitoxin. Dosage: 3 injections of 1 cc. at intervals of 1 week between doses.

Diphtheria Toxoid (Anatoxin).—2 or 3 doses with intervals of 2 to 3 weeks between doses.

Diphtheria Toxoid Alum Precipitated.—One dose subcutaneously.

Diagnostic.—Diphtheria Toxin for The Schick Test. Already diluted 0.1 cc. intracutaneously constitutes a 1/50 volume of diphtheria toxin and the other contains sterile physiologic salt solution with which the toxin is diluted before administration.

Dysentery.—Bacillary Antidysenteric Serum.—50 to 150 cc. either intravenously or intramuscularly (Lautin: Am. Jour. Med. Sc., 1930, 180:635).

Gas Gangrene.—Anerobic Antitoxin.

Prophylactic.—Either monovalent Cl. Welchii serum 20,000 units or polyvalent serum 20,000 units, intramuscularly.

Therapeutic.—At least 100,000 Cl. Welchii units intravenously (Reeves: Jour. Am. Med. Assn., 1935, 104:526).

Meningitis, Diplococcus (Cerebrospinal Fever).—Anti-meningococcic Serum. Concentrated serum for intraspinal treatment (N.N.R.).

Septic Cases.—Intravenously 15 to 100 cc. in divided doses.

Meningitis.—5 cc. less than fluid withdrawn; usually 30 to 60 cc. Repeated at 12-hour and later 24-hour intervals until meningococci have disappeared and sugar of the spinal fluid is up to normal.

Pneumonia.—Antipneumococcic Serum. Type 1 infections: Antibody solution intravenously, 5 cc. (10,000 units) initial dose, followed in 1 to 2 hours by 15 to 20 cc. and a dose every 2 or 3 hours thereafter until 100,000 units are given. Next dosage may be halved, if patient improves. Precautionary doses, 10 to 20 cc.

Poliomyelitis, Anterior.—Convalescent serum intramuscularly, 50 to 100 cc. Repeat several doses during 24 hours while febrile. Transfusion in older age groups or severe cases.

Scarlet Fever.—Scarlet Fever Antitoxin. In severe cases only, 10 to 50 cc. intravenously of the concentrated product. Transfusions with blood of convalescents.

Immunity Test.—Dick Test. Packages contain enough toxin for 10 tests (0.1 cc. intracutaneously).

Tetanus.—Tetanus Antitoxin.

Prophylactic.—1,500 U.S.A. units intramuscularly 3 to 5 hours before cleaning of wound by surgical methods. If risk of tetanus is great, repeat 1,500 U.S.A. units on second and fourth day and if a subsequent operation is needed and if more than 7 days have elapsed since the administration of last dose of antitoxin.

Therapeutic.—30,000 U.S.A. units intravenously under inhalation anesthesia (chloroform or ether) and simultaneously 15,000 units intramuscularly. Second day, 20,000 units intramuscularly; third day, 10,000 units intramuscularly, and fourth day, 10,000 units intramuscularly.

DRUGS SUBJECT TO FEDERAL AND CALIFORNIA STATE REGULATIONS

Federal Narcotic Regulations Governing Dispensing and Prescribing Apply to the Following Drugs:

Opium and its derivatives: Opium gum, powdered opium, tincture of opium (laudanum), tincture of deodorized opium; morphine, codeine, papaverine, apomorphine, heroin (diacetylmorphine), dilaudid, dionine (ethyl morphine) and their salts; tincture of camphorated opium (paregoric) and compound mixture of opium and glycyrrhiza (Brown Mixture) dispensed in tablets.

Cocaine and its derivatives: Coca leaves, cocaine and its salts.

Exemptions: Tincture camphorated opium (paregoric), compound mixture of opium and glycyrrhiza (Brown Mixture) and all preparations for application on skin.

The State of California requires reporting of cases of malignant and other diseases associated with addiction.

California State Regulations Governing Dispensing and Prescribing Apply to the Following Drugs:

Barbital and its derivatives, salts and compounds, including preparations containing any of the foregoing, containing more than 40 grs. (nearly 3 Gm.) to the avoirdupois or fluid ounce.

Dinitrophenol and other nitrophenols used internally.

DIETARY DATA AND VITAMIN PREPARATIONS

List of Foods Useful in Computing Diabetic and Reduction Diets

(Prepared by E. P. Joslin, M.D., and published in card form by Thomas Groom & Co., Inc., 105 State Street, Boston.)

Water, clear broths, coffee, tea, cocoa shells and cracked cocoa can be taken without allowance for food content.

Foods Arranged Approximately According to Content of Carbohydrates

5%	10%	15%	20%
*Reckon average carbohydrate in 5% veg. as 3%—of 10% veg. as 6%.			
1%–3%	3%–5%	10%	*, 15%	20%
Fruits, Vegetables (fresh or canned)				
Lettuce	Tomatoes	Str. Beans	Green Peas	Potatoes
Cucumbers	Brussels Sprouts	Pumpkin	Jerusalem Artichokes	Shell Beans
Spinach	Water Cress	Turnip	Parnsips	Baked Beans
Asparagus	Sea Kale	Kohl-Rabi	Lima Beans	Green Corn
Rhubarb	Okra	Squash	very young	Boiled Rice
Endive	Cauliflower	Beets		Boiled Macaroni
Marrow	Egg Plant	Carrots		
Sorrel	Cabbage	Onions		
Sauerkraut	Radishes	Green Peas very young		
Beet Greens	Leeks			
Dandelions	String Beans very young			
Swiss Chard	Broccoli	Strawberries	Raspberries	Plums
Celery	French Artichokes	Lemons	Currants	Bananas
Mushrooms		Cranberries	Apricots	Prunes
		Peaches	Pears	Ice Cream
		Pineapple	Apples	
		Blackberries	Blueberries	
		Oranges	Cherries	
Grape Fruit				
Ripe Olives (20% fat)				

1 gram protein	4 calories.	1 kilogram = 2.2 pounds
1 gram carbohydrate	4 calories	30 grams (gm.) or cubic centimeters (c.c.) = 1 ounce.
1 gram fat	9 calories	
6.25 gram protein contain	1 gm. nitrogen	A patient "at rest" requires 25 calories per kilogram.

30 Grams 1 oz. Contain Approximately	Carbohydrates Gm.	Protein Gm.	Fat Gm.	Calories
Vegetables 5%	1	0.5	0	6
Vegetables 10%	2	0.5	0	10
Shredded Wheat (6 triscuits)	23	3	0	104
Uneedas, two	10	1	1	53
Potato	6	1	0	28
Oatmeal, dry wgt	20	5	2	118
Oysters, six	4	6	1	49
Milk	1.5	1	1	19
Meat (cooked, lean)	0	8	5	77
Fish	0	6	0	24
Chicken (cooked, lean)	0	8	3	59
Egg (one)	0	6	6	78
Cheese	0	8	11	131
Bacon	0	5	15	155
Cream, 20%	1	1	6	62
Cream, 40%	1	1	12	116
Brazil Nuts	2	5	20	208
Butter	0	0	25	225
Oil	0	0	30	270

MEDICINAL FOODS

Dextrose (carbohydrate).....6 per cent in a **Balanced Salt Solution** (p. 59) subcutaneously or intravenously 100 cc. per hour.

Vitamins and Vitamin Products

Name of Vitamin	Occurrence; Properties	Therapeutic Effects	Vitamin Products	Dose
A....	Cod Liver Oil	antiophthalmic (xerophthalmia) antiinfective	*Cod Liver Oil..	12 cc. (infants) 24 cc. (adults)
	Halibut Liver Oil		Halibut Liver Oil (N.N.R.) ...	2.5 to 3.5 cc. (infants)
	Milk, butter, eggs, leafy vegetables, salads, carrots, oranges. Stable.		**Cod Liver Oil Concentrate (N.N.R.) ...	1 to 2 tablets (children) 2 to 3 tablets (adults)
			Cod Liver Oil with Viosterol (N.N.R.) ...	2.5 to 3.5 cc. (infants)
B....	Fat-soluble. Yeast, embryos of seeds,	antineuritic antipellagric	[Brewer's Yeast]	up to 7 cc. daily (adults)
(B_1F; B_2G)	most leafy vegetables, oranges, muscle, milk (little). Easily destroyed in cooking. Water-soluble.			
C....	Fresh fruits and vegetables, germinated peas and beans. Easily destroyed in cooking. Water-soluble.	antiscorbutic anticarious	Cevitamic acid (ascorbic acid) (N.N.R.) ...	0.01 equal to 15 to 30 cc. orange juice (infants; protective only). For parenteral administration neutralize with ¼ its weight of sodium bicarbonate.
D....	Cod Liver Oil, butter, milk (little). Stable. Fat-soluble.	antirachitic anticarious	#Viosterol in Oil (N.N.R.).	0.16 to 0.21 cc. (infants)
			##Solution Irradiated Ergosterol	0.2 to p. 4 cc. (adults) daily
			Cod Liver Oil... with Viosterol (N.N.R.)	2.5 to 3.5 cc. daily (infants) up to 7 cc. daily (adults)
			Halibut Liver Oil. with Viosterol (N.N.R.)	3 to 3.5 M. daily (infants) 7 M. daily (adults)
E....	Wheat-germ, green vegetables. Stable. Fat-soluble.	antisterility (?)	[Wheat Germ Oil]	

*The U.S.P.XI, specifies that cod liver oil must contain in each Gm., at least 600 U.S.P. units of vitamin A and at least 85 U.S.P. units of vitamin D. All brands in N.N.R. (1935), are required to have a vitamin potency of at least 850 vitamin A units per Gm., and at least 85 vitamin D units per Gm., when tested by the U.S.P.XI, method. Viosterol is a solution of irradiated ergosterol in oil.

**In N.N.R. (1935) such a concentrate has a vitamin A potency of at least 14,000 U.S.P.XI, units per Gm., or 1,100 U.S.P.XI, units per tablet or other dosage unit and vitamin D U.S.P.XI, units per tablet or other dosage unit.

##Solution of ergosterol in a vegetable oil, standardized to contain not less than 10,000 units (U.S.P., XI.) of vitamin D in each Gm.

#Viosterol in Oil (N.N.R.) is irradiated ergosterol in a vegetable oil and standardized to contain the equivalent of at least 9,000 U.S.P. units of vitamin D in each Gm.

SYMPTOMS AND TREATMENT OF POISONING

ACUTE POISONING

Acetanilide, Antipyrine and Acetophenetidin (Phenacetin)

Acetanilide, Antipyrine and Acetophenetidin (Phenacetin)

Symptoms: Vomiting (sometimes). Face cyanosed. Skin cold; profuse sweat; sometimes rash simulating measles, scarlatina or pemphigus. Collapse; feeble and irregular pulse; slow respiration.

Treatment: Gastric lavage, or emetic. External heat; recumbent position. Caffeine, digitalis. Carbon dioxide-oxygen inhalation, if needed.

Aconite

Symptoms: Tingling and numbness of tongue and mouth and sense of formication of the body. Nausea and vomiting; diarrhea with epigastric pain. Dyspnea. Pulse irregular and weak. Skin cold and clammy; features bloodless. Giddiness, staggering walk; feeling of heaviness. The mind remains clear.

Treatment: Avoid emetics. Gastric lavage with 0.1 per cent (1:1000) potassium permanganate, 250 cc. Reflex stimulants; ether, alcohol (whiskey), aromatic spirits of ammonia. Caffeine or atropine. Carbon dioxide-oxygen inhalation, if necessary. External heat; recumbent position with head lower than feet.

Alcohol (Ethyl Alcohol)

Symptoms: Ataxia, cramps, coma, decreased respiration. Abolition of the superficial and deep reflexes.

Treatment: Gastric lavage. Coffee enema. Carbon dioxide-oxygen inhalation. External heat. Aromatic spirits of ammonia, caffeine or atropine.

Alkalies, Fixed and Caustic (Sodium and Potassium Hydroxide (Lye), Sodium Carbonate (Washing Soda)

Symptoms: Burning pain from mouth to stomach; difficulty in swallowing; sloughed tissues in mouth; vomiting and purging of mucus and blood. Collapse; skin cold and clammy; pulse feeble; anxious countenance; rapid exhaustion; dyspnea. Convulsions. Unconsciousness or coma.

Treatment: Do not use stomach tube. Give from 100 to 500 cc. of 0.5 per cent hydrochloric acid. Eight ounces of olive oil by mouth. Demulcents such as gelatin, acacia or flour in water. Caffeine or digitan hypodermically, if necessary. External heat.

Ammonia

Symptoms: Gastro-intestinal symptoms, as in corrosive poisoning. Purging usual, with pain and straining. Body cold, with cold sweat. Countenance anxious. Pulse rapid and weak.

Treatment: 250 cc. (8 ounces) of olive oil by mouth. Large quantities of water. Neutralization with from 100 to 500 cc. of 0.5 per cent hydrochloric acid. **Do not use stomach tube.**

Anesthetics, Volatile (Chloroform; Ether; Nitrous Oxide)

Symptoms: Rapid heart rate, abolition of reflexes, stoppage of heart or respiration.

Treatment: Withdraw anesthetic. If circulatory collapse persists, give ouabain intravenously; epinephrine intravenously or intracardially. If respiration stops, artificial respiration; carbon dioxide-oxygen inhalation; caffeine intravenously or intramuscularly; atropine hypodermically.

Arsenic

Symptoms: Symptoms usually appear in from a quarter of an hour to one hour. Vomiting profuse; painful diarrhea; thirst; sense of constriction in throat, rendering swallowing difficult; cyanosis; coma.

Treatment: Abundant gastric lavage with warm water. External heat. Opiate for diarrhea and colic. Infusion of solution of sodium chloride containing sodium bicarbonate (5 per cent), if necessary. Milk diet. Treat patient as potential nephritic.

Atropine and Belladonna

Symptoms: Dryness of mouth. Difficulty in swallowing and articulation; thirst. Skin flushed. Temperature raised. Pulse quick. Pupils widely dilated. Purging. Delirium.

Treatment: Purified animal charcoal as antidote (2 tablespoonfuls in 250 cc. of water.) Evacuation of stomach. Caffeine. Potassium permangante 1:1,000 solution, 250 cc.; lavage with the same solution. Catheterization, if necessary. If excitation persists, barbital or paraldehyde. Physostigmine.

Barbituric Acid Derivatives (Phenobarbital, Barbital, etc.)

Symptoms: Coma, circulatory collapse, pulmonary edema, cold skin, cyanosis. Sometimes delirium, twitching, and increased reflexes.

Treatment: Cover patient warmly; apply hot water bottles. Gastric lavage. Caffeine. Ephedrine. Carbon dioxide-oxygen inhalation.

Bichloride of Mercury (Mercuric Chloride or Corrosive Sublimate)

Symptoms: Metallic taste, choking sensation. Pain in stomach, vomiting and purging of stringy mucus and blood. Tongue may be white and shrivelled. Skin cold and clammy. Pulse feeble and rapid.

Immediate Treatment: Antidotes (by mouth): Give, or direct to be given, at once a glass of milk and 4 tablespoonfuls of charcoal. Follow with 10 cc. of a 10 per cent solution of sodium hypophosphite in water. One glass of water. Lavage with antidote (one dose in 100 cc. of water). Two egg whites, or liberal dry egg albumin in water, and one glass of milk, followed by lavage with water. Four tablespoonfuls of charcoal by mouth (**Do Not Remove**). For pain and prevention of shock, morphine; begin dextrose injection intravenously; caffeine and epinephrine intramuscularly; later, infusion of citrated blood, if necessary.

Additional or Alternative Antidotal Treatment: Gastric lavage with a 5 per cent solution of sodium formaldehyde sulphoxylate (Merck; Diarsenol Co., Inc.; D. R. L., Co.) in water, leaving about 200 cc. of this solution in the stomach. Inject intravenously during a period of 20 to 30 minutes, 100 to 200 cc. of 10 per cent sulphoxylate (10 to 20 Gm.) dissolved in distilled water; repeat the injection 4 to 6 hours later in severe cases.

Treatment in the Ward: Gastric lavage twice a day with 6 quarts of sodium bicarbonate solution. Sodium acetate or citrate by mouth (amount to keep urine alkaline). Use low pressure colonic irrigation twice a day with 6 per cent solution of sulphoxylate once to two times daily. Send urine, vomitus and colonic washings to the laboratory daily for examination, for mercury (500 cc. of each). Daily specimens of urine to laboratory. Daily chemical examination of the blood. For tympanites, hypertonic (5 per cent NaCl) salt solution per rectum, or intravenously, if necessary. For stomatitis, a mouth-wash containing permanganate or Tr. Myrrh (see **Therapeutic Index**). For muscular twitchings of uremia, calcium gluconate intramuscularly or intravenously. Blood transfusion, if there is much bleeding from alimentary canal. Administration of stimulants and sedatives as indicated. Treatment is continued until symptoms have abated and mercury has disappeared from urine and colonic and gastric washings.

Boric Acid (Borax; Sodium Borate; Sodium Perborate)

Symptoms: Epigastric pain; abdominal cramps; vomiting; diarrhea; weak pulse; cold clammy skin; sometimes cyanosis and collapse.

Treatment: Keep patient warm, in recumbent position. If taken by mouth, gastric lavage; or, if given by rectum in enema, rectal lavage, warm water. Caffeine; digitalis. The kidneys should be protected by the administration of alkali (1 to 5 Gm. sodium bicarbonate and alkaline drinks or fruit juices) and of sodium thiosulphate.

Camphor (Camphor Oil; Spirit of Camphor)

Symptoms: Characteristic odor of breath; burning pain in stomach; colic; giddiness; pulse rapid and and weak. Impulsive movements; delirium. Face flushed. Sometimes convulsions. Collapse. Coma.

Treatment: Apomorphine, hypodermically. Gastric lavage repeatedly with warm water. Inhalation anesthesia to check convulsions; then barbital by mouth or intramuscularly to check excitation. Caffeine or digitan hypodermically, if necessary. External heat. Artificial respiration, if necessary. Convalescence may be prolonged.

Cantharides ("Spanish Fly")

Symptoms: Burning pain in the throat and stomach; difficulty in swallowing. Vomiting and diarrhea; mucus and blood may contain shining particles of the powder. Salivation and swelling of the salivary glands. Burning in urethra; frequent micturition. Urine contains albumin, casts and blood. Pulse weak and slow; collapse.

Treatment: Gastric lavage; mucilaginous drinks; opiate for pain. No oil by mouth. Treat as for potential nephritis (alkalies and milk diet).

Carbon Tetrachloride (Dry Cleaners; Solvents; Fire Extinguishers; Dry Shampoos; Hookworm Remedies)

Inhalation of Fumes

Symptoms: Headache; persistent nausea; anemia; slight jaundice; visual disturbances; hyperacid urine and gastric contents; decreased blood pressure; loss of consciousness; coma and death.

Treatment: Fresh air, oxygenated if necessary; alkalinization with sodium bicarbonate; remainder of systemic treatment same as below. Later, treatment of bronchitis, as needed.

Oral Administration

Symptoms: Dizziness, nausea, vomiting, diarrhea (sometimes blood), periods of unconsciousness and consciousness; rise of temperature, jaundice, urine scanty. Coma; tremors or convulsions; stoppage of heart or respiration. Fatty degeneration of liver may not be manifest for 2 or 3 days.

Treatment: Gastric lavage; catharsis (**avoid oils**). Calcium gluconate intramuscularly or intravenously. If respiration stops, artificial respiration; carbon dioxide-oxygen inhalation. Caffeine or epinephrine for circulatory collapse; digitalis. Later, treatment for liver injury; high carbohydrate and calcium diets; iron.

Chloral (Chloral Hydrate)

Symptoms: Vomiting; collapse; delirium; fall of temperature; cyanosis; dyspnea or slow respiration. Coma.

Treatment: Gastric lavage with potassium permanganate (1:1000) 250 cc. External heat. Caffeine, then digitalis. Carbon dioxide-oxygen inhalation, or artificial respiration, as needed.

Cinchophen (Atophan; "Gout and Rheumatism Cures")

Symptoms: Poisoning generally subacute or chronic, but toxic symptoms may become rapidly severe, during or in absence of administration of drug. Symptoms of cinchonism; nausea and vomiting; persistent abdominal pain; diarrhea. Jaundice; liver pain or tenderness; stupor. Urine colored red to brown. Collapse. Coma.

Treatment: Gastric lavage. Magnesium sulphate. Withdrawal of drug. Camphor oil, caffeine or digitan, if necessary. Continue with treatment for hepatitis, injections of dextrose and insulin, carbohydrate diet; bicarbonate by mouth for acidosis.

Cocaine and Other Local Anesthetics (Procaine, Butyn, Etc.)

Symptoms: Anxiety, fainting; pallor; dyspnea; brief convulsions and apnea. With smaller doses, confusion, laughter, vertigo, motor excitement, tachycardia, irregular respiration, pallor, dilated pupils and exophthalmos, paresthesia, delirium and dyspnea. If death does not occur in a few minutes, recovery generally follows.

Treatment: Gastric lavage with 1 liter of 0.1 per cent (1:1,000) potassium permanganate (if taken by mouth). One-half per cent potassium permanganate solution, if stomach is empty; otherwise, tannic acid (5 Gm.). Soluble barbital intravenously.

Cyanides (Sodium or Potassium Cyanide; Hydrocyanic Acid)

Symptoms: Characteristic odor of poison (including metal polish; etching fluid). Dyspnea; cyanosis; rapid pulse; unconsciousness; tremors; violent convulsions; dilated pupils. Cyanosis may be absent if symptoms (marked respiratory stimulation) are rapid and severe. If patient survives an hour, recovery may occur. Patients may live 3 or 4 hours.

Treatment: Inject immediately 50 cc. of 1 per cent methylene blue solution (containing 1.8 per cent sodium sulphate (Na_2SO_4)) intravenously; repeat, if necessary, until a total of 200 cc. are injected. Frequently, consciousness and reflexes are restored before the first 50 cc. is completely injected, but, if the patient lapses into unconsciousness, or manifests respiratory depression, resume the methylene blue treatment. As quickly as possible, proceed with gastric lavage, using 5 per cent sodium thiosulphate: this oxidizes any unabsorbed poison. Artificial respiration, or oxygen-carbon dioxide inhalation, if necessary, or as needed, for the cyanosis. Caffeine, digitan or strophanthin for circulatory and respiratory stimulation.

Alternative Treatment: Give at once a slow and careful intravenous injection of 1 per cent sodium nitrite solution, in 5 divided injections, until 50 cc. are injected in about one hour. If improvement is manifested, but prognosis is still unfavorable, the injection may be cautiously continued, but is to be stopped at once in case of sudden collapse. Epinephrine should be ready at hand to combate nitrite shock, if necessary. Fortify the nitrite treatment at once with the intravenous injection of 20 cc. of a freshly prepared 5 per cent aqueous solution of sodium thiosulphate (filtered), and, if necessary, continue the injection up to a total of 500 cc., if possible. The remainder of the treatment is the same as above. (The solutions used in these treatments can be readily sterilized by boiling for 15 minutes.)

Digitalis

Symptoms: Vomiting, diarrhea. Slow pulse; cardiac irregularity. Lassitude, muscular and sensory derangements. Scanty urine, or anuria.

Treatment: Gastric lavage with potassium permanganate 0.1 per cent (1:1,000), or tannic acid, 1 per cent. Horizontal position. External heat. Atropine hypodermically. Sodium nitrite for vasoconstriction. Quinidine for cardiac irregularity.

Dinitrophenol (Alphadinitrophenol; Dinitronaphthol; Dinitrocresol; "Anti-fat or Obesity Cures")

Symptoms: Marked sensation of heat, flushed skin, marked sweating; restlessness; rapid and deep respiration; rapid pulse; high fever, temperature may reach 110° F. Rapid post-mortem rigor (heat rigor); icteric tint of tissues from drug.

Treatment: Copious gastric lavage with 5 per cent sodium bicarbonate and 0.1 per cent potassium permanganate. Immerse patient in ice-cold bath to control the fever and keep body temperature at normal. Copious water drinking; intravenous injections of physiologic salt solution or 6 per cent dextrose solution. Oxygen inhalation for cyanosis, as needed. Caffeine or digitan hypodermically, in case of collapse.

Ergot

Symptoms: Pale skin; small and rapid pulse; constricted arteries. Hallucinations. Cyanosis of the finger tips and toes. Sensory disturbances. Ascending gangrene of the extremities.

Treatment: Gastric lavage in acute poisoning; withdrawal of administration of ergot. Nitrites. Warm room. Periodic inhalation of carbon dioxide and oxygen.

Fluoride (Roach and Insect Powders)

Symptoms: Nausea and vomiting; burning, cramp-like abdominal pains; diarrhea. Sometimes tremors or convulsions. Greyish blue cyanosis. Urine and blood show presence of fluoride.

Treatment: Copious gastric lavage with lime-water or weak calcium chloride solution. Calcium gluconate intramuscularly, or calcium chloride, 10 cc. of 10 per cent in water, intravenously. Digitan hypodermically; artificial respiration, if necessary. External heat.

Formaldehyde (Formalin)

Symptoms: Odor. Sore mouth. Dysphagia. Severe abdominal pain. Unconsciousness and collapse. Later diarrhea and tenesmus.

Treatment: Swallow a tumblerful of 0.2 per cent ammonia. Lavage with dilute ammonia followed by raw egg, or egg albumin in water.

Gas (Garage Gas, or from Defective Flue Fumes; Carbon Monoxide)

Symptoms: Giddiness and singing in the ears. Lividity of face and body. Loss of muscular power. Pupils dilated. Dyspnea. Unconsciousness and collapse.

Treatment: Carbon dioxide-oxygen inhalation, or artificial respiration, if needed. Bleeding followed by transfusion, if indicated. External heat. Oxygen tent, if available. Digitalis.

Hydrochloric Acid (Muriatic Acid; Soldering Fluid)

Symptoms: Gastro-intestinal symptoms; coffee-ground vomitus. Purging usual, with pain and straining. Body cold, with cold sweat. Countenance anxious. Pulse rapid and weak.

Treatment: Magnesia magma 100 to 400 cc. White of egg or olive oil as a demulcent; external heat; camphor oil, caffeine or digitan hypodermically, if necessary.

Iodine (Tincture of Iodine; Lugol's Solution)

Symptoms: Pain and heat in throat and stomach. Vomiting and purging, vomitus being yellow or blue if starchy matter is present in the stomach. Stools may contain blood. Intense thirst. Giddiness, faintness and convulsions.

Treatment: Sodium thiosulphate by mouth (1 to 10 Gm. in water) as an antidote. Then lavage with 1 per cent sodium thiosulphate. Later, thin starch paste or flour soup. External heat; camphor oil, caffeine or digitan hypodermically, if necessary.

Lead (Lead Acetate or Sugar of Lead)

Symptoms: Metallic taste, dry throat, intense thirst. Abdominal colic. Constipation, dark feces. Vomiting may occur. Giddiness; stupor; convulsions; coma.

Treatment: Magnesium sulphate in solution as antidote. Lavage with 1 per cent sodium sulphate, mucilaginous (acacia) or egg albumin drinks. External heat. Cathartic after lavage. Calcium gluconate intramuscularly. Opiate for colic.

Methyl Chloride (Refrigerants)

Symptoms: Drowsiness; mental confusion; nausea; vomiting; unconsciousness. Convulsions in severe poisoning; coma. Temperature, pulse and respiration increased; blood pressure low; anuria. Later, anemia; nephritis.

Treatment: Artificial respiration; carbon dioxide-oxygen inhalation. If circulatory collapse persists, epinephrine intravensously; caffeine hypodermically or intravenously. Later, treatment for anemia and nephritis.

Morphine and Opium (Laudanum)

Symptoms: Coma, gradual in onset. Symmetrical pinpoint pupils that dilate terminally. Respiration slow and shallow. Body cold. Cyanosis, convulsions.

Treatment: Potassium permanganate 0.1 per cent (1:1,000), 250 cc. by mouth. Gastric lavage with same solution of potassium permanganate. Black coffee. Try to keep the patient awake by suggestion. Carbon dioxide-oxygen inhalation. Artificial respiration, if necessary. External heat. Caffeine or atropine hypodermically, if respiration fails to improve.

Mushrooms

Symptoms: Colic; vomiting; purging. Mental excitement followed by coma. Extremities cold. Pulse slow. Respiration stertorous. Pulmonary edema. Pupils dilated.

Treatment: Gastric lavage. External heat. Atropine.

Nicotine and Tobacco

Symptoms: Severe depression; prostration and muscular weakness; severe nausea and vomiting. Marked dyspnea. Weak, rapid pulse. Pupils first contracted then dilated. Muscular tremors, followed rapidly by convulsions.

Treatment: If free vomiting has not occurred, wash out stomach repeatedly with potassium permanganate, 0.1 per cent (1:1,000) and warm water. Strong coffee. Caffeine or digitan hypodermically, if necessary. External heat. Artificial respiration, if necessary.

Nitric Acid

Symptoms: Pain in throat and stomach. Vomiting of whitish, flaky matter that blackens on exposure to light.

Treatment: Magnesia magma, 100 to 400 cc. White of egg, or egg albumin in water, or olive oil (250 cc.) as a demulcent. External heat. Camphor oil, caffeine or digitan hypodermically, if necessary.

Nitrites and Nitroglycerin

Symptoms: Collapse; unconsciousness; cyanosis or pallor; low blood pressure; slow pulse, irregular respiration. Sometimes vomiting and convulsions. Persistent cyanosis. Methemoglobinuria.

Treatment: Recumbent position. Gastric lavage if poison has been swallowed. Guaiacol 0.5 Gm. and Berlin blue 0.5 Gm. together, gastrically or orally, 3 to 6 times daily. If necessary, epinephrine intravenously, digitan hypodermically; oxygen inhalation. External heat.

Nitrobenzene (Oil of Mirbane; Shoe Dyes; Aniline; Orthodinitrobenzol)

Symptoms: Incoordination; ringing in ears; vomiting; pronounced cyanosis; sometimes jaundice; dyspnea; unconsciousness; nystagmus; unequal pupils; coma, asphyxial convulsions. Methemoglobin. Afterwards, vertigo, headache, weakness and nausea.

Treatment: Abundant and continued gastric lavage; physiologic salt solution containing sodium bicarbonate intravenously; caffeine or digitan hypodermically. Saline cathartic. Oxygen inhalation. Transfusion, if necessary.

Oils, Volatile and Ecbolic (Tansy; Pennyroyal; Santal; Absinthe; Turpentine)

Symptoms: Characteristic odor of breath; burning; nausea; vomiting; eructations; colic; diarrhea. Skin-rash; jaundice. Convulsions; dilated pupils; rapid stertorous respiration; pulse slow and feeble; unconsciousness. Coma. Sometimes, uterine hemorrhage; abortion; hematuria.

Treatment: If vomiting has not occurred, repeatedly wash out stomach with warm water. Demulcents: acacia starch or flour in water. Magnesium sulphate unless diarrhea is present. Opiate for colic. Camphor oil, caffeine or digitan, if necessary. External heat. Barbital for excitation. Later, treatments for nephritis and hepatitis; abortion.

Oxalic Acid and Oxalates

Symptoms: Gastro-intestinal symptoms as in corrosive poisoning. Purging in most cases, with pain and straining. Body cold, with cold sweat. Countenance anxious. Pulse rapid and weak.

Treatment: Calcium lactate (10 to 20 Gm. in 250 cc. of water). Potassium permanganate, 0.1 per cent (1:1,000), 250 cc. by mouth. Gastric lavage with same permanganate solution. Demulcents. Heat applied to abdomen. Camphor oil, caffeine or digitan hypodermically, if necessary.

Paris Green

Symptoms: Symptoms usually appear in from a quarter of an hour to one hour. Burning heat and constriction or choking in throat, rendering swallowing difficult. Nausea and incessant vomiting and purging. The vomiting matter may be green from bile, or, in the case of arsenic, black from the admixture of soda, or blue from indigo. Pain in the stomach and abdo-

men. Cramps in the calves of the legs. Urine may be suppressed. There may be delirium or paralysis. Collapse; skin cold and clammy, sometimes showing eczematous rash. Pulse small, quick and irregular, or imperceptible.

Treatment: Abundant gastric lavage with warm water. Infusion of physiologic salt solution, if necessary. Tincture of opium for diarrhea and colic. Caffeine, strychnine or atropine, as needed, for circulatory and respiratory stimulation. Milk diet. Treat as for potential nephritis.

Phenols (Carbolic Acid; Lysol; Cresols; "Sheep-dip")

Symptoms: Characteristic odor present. Burning sensation in mouth and throat; burns on lips and in mouth; nausea and vomiting. Abdominal pain. Faintness; collapse; pulse slow and weak; face livid; cold sweat; respiration depressed; unconsciousness. Coma. Urine scanty, with smoky color.

Treatment: Gastric lavage with 10 per cent ethyl alcohol in water, 1 quart; continuous lavage with warm water. Infusion of physiologic salt solution; epinephrine intravenously or intracardially. Caffeine or digitan hypodermically. External heat. Artificial respiration, if necessary. Later treatment same as for after effects of corrosives.

Phosphorus, Yellow (Matches)

Symptoms: Symptoms usually appear in three stages: (1) A few hours after administration, there develops a garlic taste, gastro-intestinal irritation, burning pain, thirst, swelling of the abdomen and vomiting of blood (green or black). The vomitus has a garlic odor and in the dark may be phosphorescent. The patient may die, or there may be (2) An intermission of symptoms for three days or more, with a feeling of malaise followed by (3) The final stage, characterized by intense jaundice, enlarged liver and distended abdomen; great prostration; cold sweat; an anxious look; feeble pulse; muscular twitching; coma.

Treatment: Two hundred cubic centimeters of 0.2 per cent solution of copper sulphate by mouth. Lavage with from 5 to 10 liters of the same solution followed by lavage with 1 liter of 0.1 per cent (1:1,000) potassium permanganate; followed by the administration of 100 cc. of liquid petrolatum. No fats or oils should be given, as they aid absorption. External heat. Treatment continued for liver injury—high carbohydrate diet; dextrose and insulin.

Potassium Chlorate (Chlorate of Potash; Mouth Washes; Gargles; Throat Tablets; Dentifrices)

Symptoms: Pain in gastric region; nausea; vomiting. Dyspnea, cyanosis. Skin may be jaundiced. General excitation; delirium; collapse; coma. Methemoglobinemia; disintegration of corpuscles. Later, scanty urine or complete anuria; albuminuria; hematuria; methemoglobinuria; nephritis.

Treatment: Gastric lavage, mucilaginous drinks. External heat. Carbon dioxide-oxygen inhalation. Caffeine or digitan hypdermically, if necessary. Blood transfusion in severe cases. Treat as for potential nephritis (alkalies and milk diet).

Quinine and Quinidine

Symptoms: Ringing in ears, disturbed vision, photophobia. (Later deafness and blindness.) Nausea; vomiting. Faintness. Difficulty of speech; somnolence; unconsciousness; alternating with delirium and coma. Pulse slow and feeble. Sometimes convulsions.

Treatment: Tannic acid by mouth. Gastric lavage with potassium permanganate 0.1 per cent (1:1,000). Epinephrine intravenously or intracardially, if necessary. Caffeine or digitan hypodermically. If excitation persists, barbital by mouth.

Strychnine and Nux Vomica ("A.B.S." Pills)

Symptoms: Feeling of suffocation and lividity of the face. Tetanic convulsions, with short intermission, causing sweating and exhaustion, opisthotonus, risus sardonicus, staring eyes, fixed chest and hard abdominal muscles. Hearing and sight are acute, and consciousness is retained. The muscles of the jaw are not affected until late.

Early Treatment: Give by mouth, or with stomach tube, purified animal charcoal, from 1 to 2 tablespoonfuls in a glass of water. Gastric lavage with potassium permanganate, 0.1 per cent solution (1:1000).

Later Treatment: When muscular hypertonicity develops, arrest hyperexcitability or convulsions with inhalation anesthesia (ether or chloroform) and then inject intramuscularly soluble barbital, 1 Gm. (20 cc. of 5 per cent), later by mouth; or pentobarbital, 6 mgms. ($^1/_{10}$gr.) per pound body weight as the first dose and one half this amount for succeeding doses. Do not use any methods that excite spasm, such as attempting intravenous injection. The patient should be isolated and kept absolutely quiet. Ether inhalation should be given, if convulsions continue. Artificial respiration, if respiration fails.

Thallium (Depilatories; Rodent Poisons; "Thalgrain")

Symptoms: Abdominal colic, nausea, vomiting and diarrhea; constipation; stomatitis; alopecia; peripheral neuritis; central nervous involvement (ptosis, strabismus, convulsions, choreiform movements; optic atrophy). Evidences of liver damage; nephritis; sometimes pulmonary edema. Thallium in urine.

Early Treatment: If emesis has not occurred, copious gastric lavage with 1 per cent sodium or potassium iodide (in water); catharsis (avoid sulphates). If shock is present, 25 Gm. (50 cc. of 50 per cent) dextrose intravenously; external heat; reflex stimulants; epinephrine; caffeine or digitan hypodermically; artificial respiration, if necessary.

Later Treatment: Rest in bed. Control mobilization of thallium in body by daily intravenous injections of sodium iodide, about 15 to 40 cc. of 2.3 per cent in water (freshly prepared) (about 0.3 to 1 Gm. NaI) until urine test shows absence of thallium; dose of iodide may gradually be doubled. Daily chemical examination of urine; collect and evaporate to dryness 24-hour urines for thallium test—absence of, or only slight, green color on flaming of residue. When symptoms of thallitoxicosis subside, proceed cautiously to increase elimination of thallium by intravenous injection of sodium thiosulphate, 0.3 to 1 Gm. (6 to 20 cc. of 5 per cent in water; freshly prepared) for adult; alternating with sodium iodide solution intravenously, if necessary. Pilocarpine (promotes secretion); calcium lactate, if necessary; dilute hydrochloric acid for achlorhydria; bland ointments for dermatitis; barbital or codeine for restlessness and pain; treatments for liver-injury and nephritis, if necessary.

CHRONIC POISONING

Alcohol (Alcoholism)

Symptoms: Characteristic breath, furred tongue, Anorexia; cachexia; nausea and morning vomiting; diarrhea; sweating; anemia; limbs tremulous and enfeebled; face dull, expressionless and "groggy"; insomnia; low spirits, vacillating and unreliable; indecision with untruthfulness and tendency to exaggerate; tremor; difficulty in walking; giddiness; peripheral neuritis with high-stepping gait and tenderness of legs and feet; commencing liver cirrhosis; gouty tendency; mental enfeeblement with loss of

memory; depravity; delusions; delirium tremens, mania or general paralysis.

Treatment: Withdraw alcoholic beverage. General attention to hygiene, nutrition and re-education. Institutional care. Control restlessness, insomnia or withdrawal symptoms (delirium tremens) with paraldehyde, scopolamine hydrobromide, or barbital, if necessary.

Antipyrine and Aminopyrine (Agranulocytosis; Granulocytopenia; Agranulocytic Angina)

Incriminated Products: Antipyrine, aminopyrine (pyramidon); mercury; bismuth and gold; radium compounds; arsphenamine; acetylsalicylic acid; hydroquinine; dinitrophenol; acridines (acriflavine); quinine; orthoiodoxybenzoate; coal-tar products in general; foreign proteins; typhoid vaccine; bacterial toxins. Many patented hypnotic-nalgesic mixtures contain antipyrine, aminopyrine or aspirin and different barbitals, such as the following: Allonal, Alphebin, Amarbital, Amido-Neonal, Amidophen, Amifeine, Am-Phen-Al, Ampydin, Amytal Compound, Benzedo Compound Capsules, Cibalgine, Cinchopyrine Tablets, Compral, Cook Analgesic Tablets, Dysco, Gardan, Gynalgos, Hexin, Ipralidon, Kalms, Lumodrin, Midol, Mylin, Neonal Compound, Neurodyne, Nod, Optalidon, Peralga, Phenamidal, Pyraminal.

Symptoms: Lassitude; sudden onset of fever; chills; malaise, prostration; gingivitis; ulceration and gangrene of tonsils, tongue and buccal membranes; rectal and vaginal ulcerations; marked leucopenia, especially reduction of polymorphonuclear leucocytes and neutrophiles; hemoglobin and erythrocytes normal; general debility; decreased resistance to intercurrent disease, especially colds, influenza, pneumonia, etc.; sudden death, generally from an infectious disease. Full course of disease in few days or weeks; mortality, high. Vincent's angina may complicate the symptoms, but this disease is accompanied by leucocytosis.

Treatment: Remove suspected cause. Attention to oral and dental hygiene, general hygiene and nutrition. Intravenous or intramuscular injections of pentnucleotide (N.N.R.) 10 to 20 cc., and adenine sulphate; liver extract; irradiation. Recovery slow and uncertain.

Arsenic

Arsenic-containing Products: Arsenic trioxide (white arsenic), solution of potassium arsenite (Fowler's Solution), insecticide sprays, "tonics," "cancer cures or remedies."

Symptoms: Anorexia; cachexia; puffiness of eyelids; conjunctivitis; scleritis with smarting; thirst and dryness of mouth; rhinitis; anemia; gastrointestinal disturbances—nausea, vomiting, diarrhea, and blood in the stools, colic, sensation of weight or tenderness in gastric region; dry pigmented skin with eruptions; loss of hair and finger nails; insomnia; headache; peripheral neuritis—aching pains in limbs and joints; voice rough and harsh; hemoptysis; general debility; albuminuria and other evidences of nephritis; jaundice and other evidences of hepatitis; ascites; generalized edema; collapse.

Treatment: Remove suspected cause. General attention to hygiene and nutrition. Iron for anemia; dextrose and bicarbonate for acidosis; opiates for colic. In later stages, treat as potential nephritic. Recovery slow.

Benzene

Products: Benzol, volatile solvents, cleansers, fuels.

Symptoms: Headache; loss of body weight; anorexia; nausea; giddiness; palpitation; fainting spells; weakness; lassitude; insomnia; anemia; frequent colds; leucopenia; hemorrhages in skin and mucous membranes; hemoptysis; mental dullness and depression; nervous irritability; vision impaired.

Treatment: Remove cause. General attention to hygiene and nutrition. Iron and liver extract for anemia; blood transfusion, if necessary. Pentnucleotide (N.N.R.) for leucopenia. Barbital for insomnia. Prolonged rest.

Cinchophen and Neocinchophen (Cinchophen Toxicosis)

Cinchophen-containing Products: Phenylcinchoninic acid, atophan, atophanyl, diiodoatophan, quinophan, agotan, phenoquam, iriphan, leucotropin, atophan-urotropin, fantan, novatophan, tolysin, weldona, farastan, atoquinol, moniodocinchophen; patented or trade-marked "gout and rheumatism remedies."

Symptoms: Anorexia; cachexia; nausea and vomiting; diarrhea; jaundice; persistent abdominal pain; liver tenderness; symptoms of cinchonism (quinine); stupor. Urine dark or reddish due to oxidation products of cinchophen.

Treatment: Stop use of drug or suspected product. Magnesium sulphate. Injections of dextrose and insulin; carbohydrate diet; sodium bicarbonate by mouth for acidosis.

Cocaine (Cocainism)

Symptoms: Anorexia; cachexia; anemia; nervousness; tremors; insomnia; neurasthenia; sunken and unsteady eyes; illusions of sight and hearing; neuromuscular irritability and analgesia; sensation of insects crawling on skin; palpitation; gastrointestinal disturbances; apathy, laziness and inaptitude; unsocial; marked depravity; melancholia; hallucinations; suicidal mania. If cocaine is used in a snuff or spray, atrophic rhinitis, ulcers and perforation of septum. Withdrawal symptoms: great craving for drug, itching, general delirium, mania, tremors, convulsions.

Treatment: Withdraw drug. Control withdrawal symptoms with paraldehyde, barbital or scopolamine; pains with amidopyrine or salicylates; catharsis with magnesium sulphate. Institutional care. General attention to hygiene, nutrition and re-education.

Fluoride (Fluorosis)

Source: Drinking waters and foods of contaminated regions (chiefly Southwestern United States); insecticide sprays; adulterated baking powders.

Symptoms: Dental abnormalties, especially "motled teeth" in children; teeth stained, pitted, corroded, porous; imperfect calcification of bones; stunted growth of young; loss of body weight; gastrointesinal disturbances; anemia. Fluoride may or may not be present in urine and milk.

Treatment: Remove suspected cause, or prevent exposure. Milk diet, calcium diphosphate, or calcium salts and sodium phosphate. General attention to hygiene and nutrition. Correction of dental abnormalities by dentist.

Hypnotics (Soporifics; Depressants)

Representative Drugs: Chloral hydrate ("bromidia"); barbitals (veronal; luminal); bromides ("triple bromides"; "bromidia"); paraldehyde; sedormid; chloralamide.

Symptoms: General depression; anorexia; cachexia; gastrointestinal disturbances; dyspnea on exertion; low body temperature; skin eruptions; urticarial

rashes with petechiae and ecchymoses and ulceration about the nails; volubility in speech; vertigo; insomnia; lassitude; nervous symptoms outstanding—defective memory, lack of concentration, small pupils, ataxia; tremors, sensory disturbances, spasticity of limbs, sometimes twitching and heightened reflexes. Hematoporphyrinuria after sulphonals. Bromides and barbitals are excreted in urine and present in cerebrospinal fluid. Bromidism.

Treatment: Remove suspected cause. Control excitation, if necessary, using some general depressant, such as paraldehyde or scopolamine, but avoid drug used by patient. General attention to hygiene, nutrition and re-education.

Lead (Plumbism)

Sources: Occupation, food, drinking water, cider and beer, abortifacients, hair dyes and cosmetics; "ethyl" gasoline vapors.

Symptoms: Loss of body weight; anorexia; malaise; digestive disturbances; facial pallor; pinched features; anemia; cachexia; stippling of corpuscles; blue line on gums; gingivitis; colic; constipation; cramps in arms, legs and back; menstrual disturbances; arthralgia (rheumatic pains); wrist-drop; muscular atrophy; asthenia; headache; giddiness, nervousness, irriability; dimness of vision; convulsions; optic neuritis; high blood pressure; chronic nephritis; lead in urine.

Treatment: Remove cause or prevent exposure to lead. General attention to hygiene and nutrition. In acute stages, promote deposition of lead as inactive form by milk diet, calcium salts. When symptoms abate, judiciously mobilize and promote elimination of lead by diuretic and cathartic salts (magnesium sulphate), ammonium chloride, sodium bicarbonate, sodium iodide, and parathyroid extract. Atropine or scopolamine, papaverine or morphine for colic. Massage, electricity, etc., for palsies and atrophies. Recovery is slow.

Morphine and Opium (Morphinism; Opiumism)

Representative Opiates: Opium, morphine, heroin, codeine, dilaudid, pantopon.

Symptoms: Similar to those of Cocainism, but less marked depravity and mania; pupils constricted; scarred skin from injections of drug. Withdrawal symptoms same as for Cocaine.

Treatment: Same as for Cocaine.

FATAL DOSES OF IMPORTANT DRUGS

The following list of acute fatal doses may be of value in the treatment and prognosis of poisoning. The doses indicate approximate quantities of drugs, in Gm. or cc., which have been reported or estimated for an adult of 70 Kg. (140 pounds) body weight. Gases are not included. All the doses are oral or gastric, except as indicated. Doses followed by a question mark (?) were estimated from fatal doses in animals. The plus sign (+) indicates that the fatal dose is probably somewhat higher than the quantity listed.

	Gm. or Cc.
Acetarsone (Stovarsol)	8.0
Acetanilide	50.0
Acetophenetidin	50.0
Acetylsalicylic Acid (Aspirin)	30.0 to 40.0
Acetone	100.0+
Aconite	0.004 to 0.006
Adalin	10.0
Alcohol, Amyl (Fusel Oil)	70.0+?
Alcohol, Ethyl (Ethanol)	250.0 to 400.0
Alcohol, Methyl (Methanol)	100.0 to 250.0
Amytal, Sodium	8.0?
Amylene Hydrate	26.0+
Aminopyrine (Pyramidon)	8.0 to 10.0
Antipyrine	20.0+
Aniline	5.0?
Antimony and Potassium Tartrate (Tartar Emetic)	0.15
Apomorphine Hydrochloride	2.4?
Arsenic Trioxide (White Arsenic)	0.12
Arsphenamine (Salvarsan)	7.0 (vein)
Aspidium (Male Fern) Oleoresin	8.0
Atropine	0.1+
Avertin (Tribromethanol)	42.0 (rectal)
Barbital	10.0
Benzene (Benzol, C_6H_6)	2 per cent (vapor)
Betanaphthol	4.5
Bichromate, Potassium	8.0 to 15.0
Borate, Sodium (Borax)	15.0 to 30.0
Boric Acid	15.0 to 30.0 (3.0 to 6.0 infants)
Bromide, Potassium	100.0
Bromide, Sodium	100.0
Bromoform	2.0 to 6.0
Bromural	15.0+
Calcium Chloride	250.0; 28.0 (vein)
Calcium Cyanamide	40.0 to 50.0

Calomel (Mercurous Chloride)..... 0.5
Camphor..... 2.0+
Cantharides..... 8.0
Cantharidin..... 0.03
Carbon Disulphide.....0.15 mgm. per cent (vapor)
Carbarsone..... 10.0 to 14.0?
Carbon Tetrachloride.....400.0 to 500.0?
Chenopodium, Oil..... 6.0
Chloral Hydrate..... 6.0 to 12.0
Chlorate, Potassium..... 5.0 to 30.0
Chlorbutanol..... 6.0 to 12.0
Chloroform.....1.0 per cent? (inhalation)
Chromate, Potassium..... 70.0?
Cibalgin, Veramon, Compral, Allonal, et al.....8 to 60 tablets (toxic)
Cinchophen..... 37.0 to 70.0
Cocaine Hyrochloride..... 1.5
Codeine Sulphate.....3.0 to 5.0 (hypodermic)
Colchicine..... 0.008
Colocynth (Bitter Apples)..... 3.0
Coniine..... 3.0
Conium (Hemlock; Horse-radish).... 30.0+
Copper, Sulphate..... 20.0
Cresol..... 20.0+
Cresol, Ortho.....30.0 (hypodermic)
Cyanide, Sodium or Potassium..... 0.25
Dial..... 2.4
Digitalis..... 2.5 to 5.0
Dilaudid..... .04 to .08?
Dimethyl Sulphate.....1:2,000 (?) (inhalation)
Dinitrophenol..... 1.2 to 3.0
Ephedrine Sulphate or Hydrochloride 40.0
Epinephrine.....0.002 to 0.006+
Emetine Bismuth Iodide..... 2.0?
Emetine Hydrochloride..... 1.0?
Ergot, Fluidextract.....500.0?
Ergotamine.....0.04 (hypodermic)
Ether.....11 per cent (inhalation)
Eucalyptus Oil..... 25.0
Eucalyptol..... 10.0 to 30.0
Fluoride, Sodium..... 3.0 to 14.0
Formaldehyde, 40 per cent (Formalin) 50.0 to 90.0
Gentian Violet..... 1.0
Ginger Paralysis (Triorthocresyl Phosphate)..... 30.0?
Glycol, Ethylene.....200.0 to 400.0
Glycol, Propylene.....500.0+?
Hedonal..... 8.0+
Heroin Hydrochloride..... 0.7 to 0.2
Heptylresorcinol..... 70.0?
Hexavandate, Sodium..... 7.0+

Hexylresorcinol..... 35.0 to 52.0
Hydrocyanic Acid..... 0.05
Hyoscyamine Hydrobromide..... 0.6?
Hyoscyamus (Henbane).....500.0?
Iodine..... 2.0 to 3.0
Iodobismuthite, Sodium (Iodobismitol) 6.0 to 8.0
Ipral..... 9.8?
Kerosene (Petrol)..... 10.0 to 50.0
Lead Acetate (Sugar of Lead)..... 50.0
Lye (KOH, K_2CO_3; Caustic Potash)... 30.0
Lysol (Liquor Cresolis Sapon. N. F.)..250.0?
Magnesium Sulphate.....90.0 (muscle)
Merbaphen (Novasurol).....30.0 (hypodermic)
Mercuric Chloride (Corrosive Sublimate or Mercury Bichloride)..... 1.0
Mercuric Iodide..... 25.0
Mercuric Cyanide..... 1.0
Mercuric Salicylate..... 2.5 (muscle)
Mercurous Chloride (Calomel)..... 0.5
Metrazole (Cardiazole).....5.2? (hypodermic)
Methylene Blue..... 70.0 (oral)
2.0+ (vein)
Morphine Sulphate or Hydrochloride. 0.2 to 0.4
Muscarine.....0.15 (hypodermic)
Napthalene (Moth Balls)..... 2.8
Neodorm (Ethyl-isopropyl-bromo-acetamide)..... 50.0
Neosynephrine..... 0.4 (vein)
Nicotine..... 2.0
Nirvanol (Ethylphenylhydantoin).... 15.0
Nitrite, Sodium..... 5.0? (vein)
Nitrobenzene (Oil Mirbane; Shoe Dye) 1.0
Nitroglycerin..... 3.0? (vein)
Nupercaine..... 0.09
Neoarsphenamine (Neosalvarsan).... 14.0 (vein)
Neonal (N-butylethyl barbital)..... 6.0?
Opium..... 0.3 to 0.6
Ouabain (g-Strophanthin)..... 0.007 (vein)
Oxalic Acid..... 5.0
Oxalate, Sodium or Potassium..... 5.0 to 10.0
Pentobarbital..... 5.9?
Permanganate, Potassium..... 28.0 to 40.0
Paraphenylenediamine Hydrochloride (Ursol)..... 7.0 to 15.0
Paraldehyde..... 25.0 to 100.0
Pernocton..... 4.0?
Phanodorm..... 10.0
Phenobarbital (Luminal)..... 4.0
Phenol..... 8.5 to 60.0
Phosphorus, Yellow..... 0.05

Physostigmine Sulphate or Salicylate	0.2(hypodermic)
Picric Acid	2.0+
Pilocarpine Salts	0.5+ (hypodermic)
Plasmochin	1.5?
Potash, Caustic or Lye (Potassium Hydroxide; Potassium Carbonate)	30.0
Quinine, Sulphate or Hydrochloride	20.0
Quinidine Sulphate	10.0
Salicylate, Sodium	30.0 to 50.0
Salicylate, Methyl (Oil of Wintergreen)	30.0
Salyrgan (Mersalyl)	1.0? (vein)
Savine, Oil	0.5
Scopolamine	0.5+
Sedormid (Isopropylallylacetylcarbamide)	20.0?
Somnifen	24.0
Strychnine Sulphate	0.1
Sulphonal	30.0 to 50.0
Thallium Sulphate or Acetate	0.8
Thuja, Oil	20.0
Trichlorethylene	1:2,000 to 1:50 (?) (inhalation)
Trinitrotoluene	50.0 to 70.0
Trional	16.0+
Turpentine, Oil or Spirits	50.0 to 200.0
Veratrum Album (Hellebore, White)	1.0 to 2.0
Veratrine	0.005+
Xylene (Used in printer's ink)	2 per cent (vapor)
Yohimbine	0.5?
Zinc Sulphate	7.0 to 14.0?

Alcohol Content of Alcoholic Beverages

	Per cent by Wt.
Beer, light	2.0 to 4.0
Beer, strong	4.0 to 8.0
Kumiss	3.0
Cider, Perry	4.5 to 5.0
Porter, Ale, Stout	5.2 to 5.8
Wine, light table	6.2 to 7.5
Wine, heavier table	7.0 to 8.0
Wine, claret	8.0 to 14.0
Wine, effervescent and champagne	9.5 to 10.5
Wine, Hock and Moselle	12.0 to 15.0
Wine, Sherry, Port	14.0 to 16.5
Wine, Tokay, Malaga, Marsala, Madeira	15.0 to 19.0
Anisette	27.0
Liqueurs	30.0 to 40.0
Cocktails (Mixtures of gin, whiskey, champagne, absinthe, etc. with aromatics and flavors)	variable up to 40.0
Brandy	36.0 to 40.0

Whiskey, Cognac, Cherry Brandy....	48.0 to 50.0
Rum, Gin (often contains turpentine), Arrack.....	50.0 to 55.0
Absinthe (contains also volatile oils, esters, ether).....	70.0 to 80.0

Adsorptive Power of Charcoal for Drugs and Poisons

1 Gm. charcoal binds:

40 to 45 mgm. phenol
390 mgm. methylene blue
580 mgm. strychnine
850 mgm. mercuric chloride

Other useful adsorbents: fuller's earth, kaolin, bone-black, caramel.

COMMON EMERGENCIES

Shock

Symptoms: Pallor; perspiration; rapid thready pulse; blood pressure low; loss of blood plasma, concentration and increased viscosity of blood; semi-consciousness or unconsciousness.

Treatment: Notify attending physician. Keep patient warm. Inject intravenously warm dextrose, 10 per cent in physiologic salt solution, 500 to 1000 c.c.; acacia, 6 per cent solution, if necessary (Caution: Reaction!). Caffeine or digitan hypodermically, if necessary, for respiratory or circulatory failure. Artificial respiration, if necessary. Prepare for blood transfusion.

Diabetic Coma

Symptoms: In acidosis, skin dry; cheeks rosy; lips red, breathing hyperpneic (Kussmaul type); breath smells strongly of acetone; pulse small and weak; eyeballs soft.

In hypoglycemia, skin moist and pale; lips cyanotic; breathing apneic; acetone not detectable; pulse full or bounding; eyeballs normal.

Treatment of Coma from Hypoglycemia: Inject dextrose intravenously, 20 c.c. of sterile 50 per cent solution (ampules). Or, inject subcutaneously 0.5 c.c. of 1:1,000 epinephrine solution and start retention enema of 10 per cent dextrose solution, giving a total of 10 to 20 Gm. dextrose. Avoid large doses of dextrose. Small amounts of granulated sugar may be placed in the cheeks. For less severe insulin shock, when the patient can swallow, a loaf or two of table

sugar or 100 c.c. orange juice or 200 c.c. of milk by mouth; repeat within fifteen or twenty minutes, if necessary.

Treatment of Diabetic Acidosis With or Without Coma: Inject insulin subcutaneously, 30 units at once; follow with 5 to 20 units every one to three hours depending on the reducing power of the urine. Absolute bed rest, with constant supervision of nurses. Keep patient warm with blankets and hot water bottles. **Caution, in case of arteriosclerosis, avoid burns!** Secure blood for determination of blood sugar and carbon dioxide combining power. Wash stomach with warm 5 per cent solution of sodium bicarbonate; leave 500 c.c. of solution in stomach. Wash lower bowel with an enema of warm soapsuds. Administer 1,000 cc. of fluids every six hours, using warm physiologic salt solution, by mouth or by retention enema. In severe dehydration, give 1,000 cc. sterile physiologic salt solution subcutaneously. In case of collapse, give the salt solution intravenously (slow injection). If patient is vomiting or unable to retain the bicarbonate solution, or if carbon dioxide combining power is below 20 per cent by volume, inject slowly intravenously 500 cc. of sterile 5 per cent solution of sodium bicarbonate prepared as follows: Bring 500 cc. of freshly distilled water to boiling and boil three minutes; remove from flame and dissolve 25 Gm. of clean sodium bicarbonate. **The bicarbonate solution must not be boiled.**

Convulsions in Infancy

Treatment: Careful examination of child, including body temperature, throat and ears, should precede use of treatment measures. Mustard bath or pack. Enema of soap suds. Chloral hydrate, 0.3 Gm. (5 grains) and sodium bromide, 1 Gm. (15 grains) by means of a catheter inserted high in the colin. Morphine, 1 mgm. ($^1/_{50}$ grain), if necessary.

Gastric Hemorrhage

Treatment: Absolute bed rest; complete starvation. Ice bag over epigastrium. Fluids by rectum, subcutaneously or intravenously. Prepare for transfusion of blood. Morphine, 0.01 to 0.016 Gm. ($^1/_6$ to $\frac{1}{4}$ grain), if necessary.

Pulmonary Hemorrhage

Treatment: Absolute bed rest. Morphine, 0.01 to 0.016 ($\frac{1}{6}$ to $\frac{1}{4}$ grain).

Cerebral Hemorrhage

Treatment: Put to bed. Elevate head of bed. Venesection, removing from 200 to 300 cc. blood, as indicated. Avoid medication.

Hemorrhage After Tonsillectomy

Treatment: Have patient sit up and breathe deeply with mouth open. Remove all clots. Apply pressure to bleeding point with gauze sponge, dry or moistened with hydrogen peroxide or 25 per cent silver nitrate solution. If bleeding continues, ligation of bleeding point. Anesthetize patient with ether; seize the bleeding point with hemostatic forceps and transfix tissues with a needle carrying fine catgut and tie. If much blood has been lost, prepare for treatment of shock.

Hemorrhages from the Nose

Treatment of Hemorrhages from Anterior Portion of Nose: Generally hemorrhages are from cartilaginous septum. Introduce a pledget of cotton, dry or moistened with hydrogen peroxide, using moderate pressure. A rubber finger cot filled with cotton or gauze and covered with petrolatum may be placed in the nostril. If simple pressure is not sufficient, shrink tissues with cocaine and epinephrine and cauterize with fused sliver nitrate or galvanocautery.

Treatment of Hemorrhage from Posterior Portion of Nose: A posterior nasal pack may be necessary. Gauze in sufficient quantities is tied to a thread which has been previously inserted through the nostril and drawn out of the pharynx. The anterior portion of the nose should be packed, while tension is applied to the thread. Remove packing in twelve to eighteen hours, to avoid possible infection of ears by way of the Eustachian tubes.

Uterine Hemorrhage

Treatment: Notify attending physician immediately. Prepare for treatment of shock, if necessary. Meanwhile, proceed as follows: place patient in knee-chest position. Prepare the field and hands aseptically Wear rubber gloves. Use a sterile Sims speculum. Paint the cervix and vault with 4 per cent mercurochrome. With uterine dressing-forceps pack two-inch sterile gauze soaked in 4 per cent mercurochrome into the vagina, starting at the external os and then well into the fornices. Continue until the vagina is filled to capacity. Remove before forty-eight hours, a small amount at a time.

PHYSIOLOGICAL AND PATHOLOGICAL DATA

Blood

	Normal Range	Pathological Range
Amino Acids in 100 cc.	6 to 8 mgm	8 to 30 mgm.
Ammonia in 100cc.	0.35 mgm	0.1 to 1.0 mgm.
Bleeding-time	1 to 4 mins	>8 mins.
Calcium in 100 cc.	9 to 11 mgm	3 to 20 mgm.
Carbon dioxide capacity	50 to 60 vols	5 to 130 vols.
Acidosis, mild		50 to 40 vols.
Acidosis, moderate		30 to 40 vols.
Acidosis, severe		<30 vols.
Alkalosis		60 vols.
Chloride, Sodium in 100 cc.	450 to 520 mgm	120 to 600 mgm.
(plasma:	570 to 620 mgm	300 to 850 m m.)
Cholesterol in 100 cc.	140 to 170 mgm	60 to 1000 mgm.
Clotting-time	4 to 8 mins	12 to 15 mins.
Creatinine in 100 cc	1 to 2 mgm	0 to 34 mgm.
Dextrose in 100 cc.	70 to 120 mgm	40 to 1300 mgm.
Erythrocytes per cu. mm	5,000,000 (male) 4,000,000 (female)	
Fat, total in 100 cc.	600 mgm	up to 2600 mgm.
Fibrinogen (as fibrin) in 100cc.	0.3 to 0.6 Gm.	
Fragility (hemolysis)	0.45 to 0.38 per cent NaCl, begins; 0.36 to 0.32 per cent NaCl, complete	
Hemoglobin in 100 cc.	14 to 17 Gm	3 to 23 Gm.
Hydrion concentration (pH)	7.28 to 7.5 (7.4 av.)	7.0 to 7.8
Incterus index ($K_2 Cr_2 O_7$) in 100 cc.	4.6	10 to 225
Lecithin in 100 cc.	300 mgm	>400 mgm.
Leucocytes per cu. mm	5,000 to 10,000	
Polymorphonuclear and Neutrocyte	4900to5040 (55 to 75%)	500to0 (agranulocytosis) >15,000
Lymphocytes (Small Moncuclears)	1500 to 1700 (15 to 35%)	up to 1,000,000
Transitional	210 to 350 (3 to 5%)	
Eosinophile	140 to 280 (1 to 4%)	350 to 560
Basophile (Mast cells)	35 (0 to 1%)	
Nonprotein nitrogen in 100 cc.	25 to 35 mgm	20 to 400 mgm.
Oxygen in 100 cc.	18 bols	<15 vols. (symptoms)
Phosphate in 100 cc.	2.5 to 4 mgm	2 to 40 mgm.
Plasma volume	1600 to 2250 cc.	
Platelets per cu. mm	200,000 to 500,000	<100,000
Pressure, arterial systolic	110 to 130 mm. Hg.	
Pressure, arterial diastolic	60 to 80 mm. Hg.	
Pressure, colloid osmotic (plasma protein)	20 to 25 mm. Hg.	
Pressure, venous (superior vena cava)	0 to 2 mm. Hg.	
Pressure, capillary (finger nail)	20 to 32 mm. Hg.	
Protein, total in 100 cc.	6.5 to 8.2 Gm.	
Albumin	4.6 to 6.7 Gm.	
Globulin	1.2 to 2.3 Gm.	
Reticulocytes per cu. mm	4,000 to 30,000 (0.1 to 0.5%)	>0 to 60,000
Sedimentation-rate, 1 cc. (Linzenmeier)	3 to 15 mm. in 45 mins.	>18mm. in 1 hr
Solids, total in 100 cc.	20 Gm	12 to 21 Gm.
Specific gravity	1.050	<1.04; >1.08
Urea nitrogen in 100 cc.	12 to 15 mgm	5 to 350 mgm.
Velocity (aorta)	50 cm. per sec.	
Viscosity (relative to water)	3.5 to 4.5	<3.0; >5.
Volume (8 to 9 per cent of body weight)	3,000 to 5,000 cc.	

Cerebrospinal Fluid

	Normal Range	Pathological Range
Albumin in 100 cc.	20 mgm	>20 mgm.
Amino Acids	30 per cent of blood	
Calcium in 100 cc.	4 to 7 mgm.	
Carbon dioxide	40 to 60 vol. per cent	
Cells, per cu. mm.	0.6	
Chloride (NaCl) in 100 cc.	720 to 750 mgm.	
Colloidal gold curves	0000000000.	0001344210 (meningitis) 5554310000 (paresis) 0001344310 (tabes)
Creatinine in 100 cc.	0.45 to 2.2 mgm.	>3.0 mgm.
Dextrose in 100 cc.	70 to 120 mgm. (fasting)	.120 mgm.
Globulin in 100 cc.	6 mgm.	>6 mgm.
Lactic Acid in 100 cc.	8 to 27 mgm.	
Magnesium in 100 cc.	3 to 3.6 mgm.	
Potassium in 100 cc.	12 to 17 mgm.	
Phosphate, total in 100 cc.	1.25 to 2.0 mgm.	
Protein, total in 100 cc.	25 mgm.	>38 mgm.
pH	7.4	
Sodium in 100 cc.	325 mgm.	
Uric acid	below blood	

Drugs which appear normally in cerebrospinal fluid: Arsenic, sulphocyanate, bromide, iodide, salicylate and bismuth (anion) (all oral, intramuscular or intravenous); alcohol, chloroform, acetone, morphine, strychnine, tryparsamide and urea (all intravenous).

Agents which do not appear normally, but may in meningitis: Ferrocyanate, trypan blue, phenolsulphonephthalein and eosin.

Drugs which affect formation: Epinephrine, pituitary extract, pilocarpine and atropine.

Urine

	Normal Range	Pathological Range
Acetone and acetoacetic acid (24 hrs.)	3 to 15 mgm.	>20 mgm.
Ammonia (24 hrs.)	0.7 Gm.	up to 5 Gm.
Calcium (CaO) (24 hrs.)	0.1 to 0.4 Gm.	0.5 to 25 Gm.
Casts (12 hrs. concentrated)	<5,000	>5,000
Chloride (NaCl) (24 hrs.)	10 to 15 Gm.	0.1 to 50.0 Gm.
Creatine (24 hrs.) children	10 to 50 mgm.	
" " adults	traces	up to 100 mgm.
Creatinine (24 hrs.)	1 to 1.25 Gm.	<>1 to 1.25
Dextrose (sugar) (24 hrs.)	absent (qualitative test)	up to 100 Gm.
Erythrocytes (12 hrs.)	<1,000,000	>1,000,000
Indican (24 hrs.)	4 to 20 mgm.	greatly increased
Leucocytes (12 hrs.)	<1,000,000	>1,000,000
Magnesium (MgO) (24 hrs.)	0.1 to 0.3 Gm.	
Nitrogen, Total (24 hrs.)	12 to 18 Gm.	10 to 700 Gm.
Oxalic Acid (24 hrs.)	15 to 20 mgm.	>20 mgm.
Phenols, Total (24 hrs.)	0.2 to 0.5 Gm.	>0.5 Gm.
Phosphate, Total (24 hrs.)	2.5 Gm.	>3.0 Gm.
Sodium (Na_2O) (24 hrs)	4 to 6 Gm.	0.5 to 25 Gm.
Specific gravity	1.015 to 1.025	1.001 to 1.060
Sulphate, Total (24 hrs.)	2.5 Gm.	>3.0 Gm.
Sulphate, Ethereal (24 hrs.)	0.1 to 0.25 Gm.	>0.3 Gm.
Urea (24 hrs.)	25 to 35 Gm.	10 to 700 Gm.
Uric acid (24 hrs.)	0.75 Gm.	0.1; 2.0 Gm.
Volume (24 hrs.)	1200 cc.	<>1200 cc.

SALINE SOLUTIONS

Isotonic Salt Solutions*

The strengths apply to anhydrous substances dissolved in distilled water and are isotonic with blood.

Sodium chloride (Physiological Salt Solution, U.S.P.) ($NaCl$) ..... 0.85 per cent
Ammonium chloride (NH_4Cl) ..... 0.82 per cent
Calcium chloride ($CaCl_2$) ..... 1.47 per cent
Dextrose (Glucose) ($C_6H_{12}O_6$) ..... 5.10 per cent
Magnesium sulphate ($MgSO_4$) ..... 3.28 per cent
Sodium acetate ($CH_3.COONa$) ..... 1.15 per cent
Sodium bicarbonate ($NaHCO_3$) ..... 0.87 per cent
Sodium bromide ($NaBr$) ..... 1.57 per cent
Sodium carbonate (Na_2CO_3) ..... 1.31 per cent
Sodium citrate ($2(COONa)$) ..... 2.46 per cent
Sodium iodide (NaI) ..... 2.29 per cent
Sodium phosphate (Na_2HPO_4) ..... 1.89 per cent
Sodium sulphate (Na_2SO_4) ..... 1.89 per cent
Sodium sulphocyanate ($NaSCN$) ..... 1.28 per cent
Sodium thiosulphate ($Na_2S_2O_3$) ..... 1.75 per cent
Sucrose (cane sugar) ($C_{12}H_{22}O_{11}$) ..... 9.79 per cent

*Any completely dissociated salt is isotonic with blood at a concentration of 1.54 millimols.

Balanced Salt Solutions

The strengths apply to anhydrous substances dissolved in distilled water. The sodium bicarbonate must be completely dissolved before the calcium chloride is added. The following solutions are adapted to all clinical uses.

Locke's Solution (pH = 7.5)

Sodium chloride ($NaCl$) ..... 0.92 per cent
Potassium chloride (KCl) ..... 0.042 per cent
Calcium chloride ($CaCl_2$) ..... 0.012 per cent
Sodium bicarbonate ($NaHCO_3$) ..... 0.015 per cent
Dextrose ($C_6H_{12}O_6$) (add before using) ... 0.100 per cent

Tyrode's Solution (pH = 8.0)

Sodium chloride ($NaCl$) ..... 0.800 per cent
Potassium chloride (KCl) ..... 0.020 per cent
Calcium chloride ($CaCl_2$) ..... 0.010 per cent
Sodium bicarbonate ($NaHCO_3$) ..... 0.100 per cent
Dextrose ($C_6H_{12}O_6$) (add before using) .. 0.100 per cent

Ringer's Solution (pH = 7.0)

Sodium chloride ($NaCl$) ..... 0.85 per cent
Potassium chloride (KCl) ..... 0.04 per cent
Calcium chloride ($CaCl_2$) ..... 0.02 per cent

Dextrose-Acacia Solution (Gum; Colloid; pH, variable)

Sodium chloride (NaCl).....0.90 per cent
Dextrose ($C_6H_{12}O_6$).....6.00 per cent
Acacia.....6.00 per cent

Strengths of acacia up to 25 per cent are used. Acacia solutions may produce severe systemic reactions and undesirable blood changes. They are not recommended for general use, but may be tried in extreme cases of shock.

Citrated Blood

Blood is drawn under sterile conditions and sodium citrate, 1 cc. of 10 per cent, is added at once to each 10 cc. blood. This is stored in an ice-chest or refrigerator, and used as needed. Citrated blood causes systemic reactions in about 50 per cent of cases.

Blood Anticoagulants

Chlorazol fast pink B.K.S. (80 to 160 mgm. per Kg. intravenously).....1 to 2 mgm. for 1 cc. blood
Chlorazol sky blue F.F.S. (Chicago Blue 6B).....1 to 2 mgm. for 1 cc. blood
Fluoride, Sodium.....4 mgm. for 1 cc. blood
Fluoride, Sodium (10 mgm.) and Thymol (1 mgm.), Mixture of (preservative for 6 to 14 days).....for 1 cc. blood
Heparin (10 to 20 mgm. per Kg. intravenously).....0.01 mgm. for 1 cc. blood
Hirudin (20 to 50 mgm. per Kg. intravenously).....0.17 mgm. for 1 cc. blood
Oxalate, Sodium.....1 mgm. for 1 cc. blood
Polyethanolsulfonate, Sodium ("Liquoide") (9 mgm. per Kg. intravenously).....0.065 mgm. for 1 cc. blood

COMMON DRUGS AND CHEMICAL SUBSTANCES EXCRETED IN URINE

Lead, arsenic, mercury, bismuth, formaldehyde (after methenamine), methenamine, iodides, salicylates, bromides, dinitrophenol, emodin cathartics, resins, alkaloids (small quantities), methylene blue, phenolphthalein, phenolsulphonephthalein, coal-tar derivatives, barbitals, bicarbonate (increased alkalinity after sodium bicarbonate, organic acids and their salts), phosphates (increased acidity after monosodium phosphate), borates, volatile oils (characteristic odor), sulphocyanate (rhodanate), hippuric acid (after benzoates and benzyl esters), glycuronic acid (after camphor, chloral, avertin, volatile oils), ethereal sulphates (after phenols), alcohol (0.1 per cent suspicious of intoxication, 0.2 per cent intoxication, 0.4 per cent stupor, 0.5 per cent coma).

COMMON DRUGS AND AGENTS WHICH INTERFERE WITH URINE TESTS

The following drugs or their products are excreted into the urine and interfere with, or obscure, ordinary urinary tests.

Color Urine

Drug	Color
Aloes	Yellowish brown (acid); red (alkaline)
Aminopyrine (Pyramidon)	Red
Betanaphthol	Olive green to reddish yellow
Cascara Sagrada	Reddish yellow; red (alkaline)
Chrysophanic Acid	Yellow (acid); red (alkaline)
Dinitrophenol	Yellow to brownish yellow
Logwood	Unchanged (acid); reddish to violet (alkaline)
Methylene Blue	Green to blue, freshly voided or on standing
Phenol (Carbolic Acid)	Dark or smoky, brownish black
Phenolphthalein	Unchanged (acid), red (alkaline)
Phenolsulphonephthalein	Red; red (alkaline)
Picric Acid	Reddish brown
Rhubarb	Reddish yellow; red (alkaline)
Santonin	Yellow; red (alkaline)
Senna	Reddish yellow; red (alkaline)
Sulphonal	Dark red

Simulate Glycosuria

Urines after taking the following drugs contain reducing substances which may give more or less positive tests with Fehling's Solution and other reagents for dextrose, but do not ferment with yeast or affect polarized light: Avertin (tribromethanol), acetanilide, acetophenetidin, antipyrine, aminopyrine, benzoates, salicylates, chloral hydrate, copaiba, morphine, rhubarb, senna, sulphonal, barbitals, terpene hydrate, volatile oils (also asphyxial states in poisoning from most drugs).

Simulate Albuminuria

Urines after taking the following drugs which contain resinous products precipitate more or less after the addition of an acid and heating and other tests for

albumin: copaiba balsam, tincture of myrrh, terpene hydrate, oleoresin of aspidium, cathartic resins (jalap, colocynth, podophyllum, elaterin) and resinous drugs in general; also, after large doses of salicylates. Esbach's reagent (picric acid) may precipitate urines after taking alkaloids and methylene blue, especially in cases of overdosage or poisoning.

DIAGNOSTIC TESTS, PROCEDURES AND REAGENTS

Part I

EXAMINATIONS AND TESTS IN THE WARD LABORATORY

Section 1: Blood

Routine Tests

Technic for the simpler tests is not given here.

Bleeding Time (Duke)

Make a finger incision sufficiently deep so that a drop of blood 2 mm. in diameter will appear spontaneously. Note the time. Remove with smooth filter paper (every 30 seconds, if possible) each drop that forms, being careful not to touch the skin. Note the time when bleeding stops. The time interval between the appearance of the first drop and the removal of the last drop represents the bleeding time. **Normal:** 2 to 3 minutes.

Blood Smear

Apply Wright's stain for 1 minute; dilute with equal quantity of distilled water for 3 to 5 minutes. Wash well with water. Drain slide until dry. Do not blot.

For malaria: Make a heavy smear and stain deeper with Wright's stain.

Coagulation Time

Capillary Method.—Use capillary glass tubing, 0.5 to 1 mm. diameter and 3 to 5 cm. long. Let the blood run up into the tube and at intervals of 10 to 15 seconds break off a small piece and gently pull it apart. Coagulation has taken place when a strand of fibrin has formed. **Normal:** 5 to 6 minutes.

Venous Blood Method (Lee and White).—With a small syringe fitted with a 20 gauge needle, puncture a vein and collect 1 cc. of blood without using suction. Note the time. Remove the needle and transfer the blood to a test tube (8 mm. diameter), absolutely clean and rinsed just previously with

physiologic salt solution. Set the tube in a rack at room temperature. At 1 minute intervals tilt the tube to see if the blood still flows. Coagulation has occurred as soon as the blood fails to flow and the tube can be inverted. Note the time. The interval between this time and that when the blood was removed from the vein is the coagulation time. **Normal:** 5 to 10 minutes. A control test is advised with the blood of a normal person.

Hemoglobin

Sahli Hemoglobinometer.—Introduce 0.1 cc. $N/_{10}$ hydrochloric acid solution to mark "10" on graduated tube and 0.02 cc. blood from pipette. Report as grams in 100 cc. of blood and as per cent, according to standard of instrument used.

Platelets

Cover Slip Method.—Use a diluting fluid containing 0.5 per cent sodium citrate in physiologic salt solution and 1 per cent brilliant cresyl blue. Puncture finger through a drop of the citrate solution (on finger) and mix the drop with a drop of citrate solution on a cover slip. Mount, ring with vaseline, and count after standing 15 minutes. A red count must be done simultaneously to determine exact number of platelets. This preparation may also be used for a reticulocyte count.

Rees-Ecker Method.—Draw diluting fluid (sodium citrate, 3.8 per cent, 100 cc., formalin, 0.2 cc., and brilliant cresyl blue, 0.1 Gm.) to mark "0.5" on red pipette, then draw blood until the top of the column reaches exactly mark "1.0", and finally diluting fluid to mark "101". Shake for 5 minutes Count as for red blood cells. **Normal:** 200,000 to 600,000.

Red Blood Cells

Use Hayem's diluting fluid (sodium chloride 1.0 Gm., sodium sulphate 5.0 Gm., mercuric chloride 0.5 Gm. in 200 cc. water).

Red Blood Cell Volume

Centrifugalize the blood used in a Wintrobe tube for 30 minutes at high speed and multiply the volume of red cells by 1.10 for shrinkage correction.

Sedimentation Time (Rate)

Cutler Tubes.—Use 0.1 cc. sodium citrate solution (3.0 per cent) and 0.9 cc. blood; mix well. Read level of red cells every 5 minutes for 1 hour. Plot a curve.

Linzenmeier Tubes.—Use 0.2 cc. sodium citrate solution (3.8 per cent) and 0.8 cc. blood; mix well;

let stand undisturbed. Read level of the red cells when column falls to 18 mm. **Normal:** More than 1 hour; usually 2 hours.

Wintrobe Tubes.—Use 2 mgm. potassium oxalate for each 1 cc. of blood in a Wintrobe tube; mix by inversion. Fill Wintrobe tube with capillary pipette. Read at 15–, 30–, 45–, and 60–minute intervals.

White Blood Cells

Use Türk's diluting fluid (3 or 5 per cent acetic acid solution containing 0.1 per cent gentian violet) or a diluting fluid containing 3 per cent acetic acid and methylene blue to color.

Special Tests

Fragility

Use 0.28 to 0.5 per cent physiologic salt solution in 12 tubes as prepared by Central Laboratory. Place 1 drop of blood from syringe with a 22 gauge needle into each tube; invert and read after 2 hours and again at end of 24 hours. Observe initial and complete hemolysis. Always make a control set on a normal patient. **Normal:** Initial hemolysis, 0.42 to 0.44 per cent. Complete hemolysis, 0.30 to 0.34 per cent.

Peroxidase

Goodpasture's Stain.—Apply for 1 minute, then add equal amount of dilute hydrogen peroxide solution (2 drops to 15 cc. of water) for 3 minutes.

Sato-Sekiyo Stain.—To a fresh, dry blood smear apply copper sulphate solution (A) for 20 seconds. Drain off and apply benzidine solution (B) for 8 minutes. Drain this off and add safranin solution (C) for 2 minutes. Wash, dry, and mount. Peroxidase granules in myelogenous and monocytic series are stained dark blue.

Red Cells, Diameter of

Halometer Readings.—Use fresh unstained smear. Look through slide at two lights 28 inches apart, and determine distance from lights at which halos meet. One-half of the distance in feet equals the mean diameter in microns. These lights are attached to the microscope table in laboratories on the medical wards. **Normal:** 7.5 m.

Reticulocytes

Blood Smear.—Use brilliant cresyl blue, saturated solution in alcohol, or 1:300 solution in water, dried on a slide; make blood smear on same slide and stain with Wright's stain. **Normal:** Less than 1 per cent.

Capillary Tube.—Use saturated aqueous solution of brilliant cresyl blue, 5 cc., and 2 per cent sodium oxalate solution, 1 cc., dried in capillary tubes. Partially fill a tube with fresh blood. Mix the blood and reagent by tilting the tube back and forth. Allow to stand 5 minutes. Mix again. Attach a small rubber bulb to one end of the tube, discard the first drop and make a fresh preparation from the next one. Seal the preparation carefully to prevent drying. Examine 1000 erythrocytes under the oil immersion lens and record the percent of reticulated cells. **Normal:** Below 1 per cent in adults.

Cover Slip Method.—See **"Platelets,"** page 63.

Section 2: Cerebrospinal Fluid

For lumbar and cisternal punctures see **Part II, Section 6.**

Cytology

Draw spinal fluid stain (equal parts of Wright's stain and glacial acetic acid) to mark "1" on "white" blood counting pipette, then draw spinal fluid to mark "11". Mix well. Place drop on blood counting chamber. After settling of cells, count the leucocytes in all 9 squares. Multiply result by $^{11}/_{9}$. Red cells stain red; leucocytes, as in Wright's smear.

Pellicle and Bacteria

Let 2 to 10 cc. cerebrospinal fluid stand in a clean test tube over night, in the ice-box, protecting it from shaking, to allow pellicle formation. If a pellicle forms, tease it out on a slide, allow it to dry thoroughly and stain for acid-fast bacilli; or send specimen to Central Laboratory immediately after obtaining fluid.

If spinal fluid is purulent, stain for bacteria as follows:

Place a few drops of uncentrifugalized fluid on slide and allow to dry in the air. Stain with Gram's stain or with carbolthionin. B. influenzae is easily broken up by centrifugalization; this organism is a very small pleomorphic bacillus varying from small diplococci to rod forms.

For fluids with low counts (500 to 2000 cells per cu.mm.) centrifugalize and place sediment on slide. Dry thoroughly without heating. Use Gram's stain, being careful to completely decolorize the gentian violet in the thicker parts. Meningococci appear as Gram-negative diplococci, intra- and

extracellular; pneumococci appear as Gram-positive diplococci or even as long chains; streptococci may appear as Gram-positive diplococci or chains. Other organisms may be found.

Protein

Qualitative.—Add a few drops of spinal fluid to 2 to 3 cc. clear Pandy's reagent (5 per cent aqueous solution of phenol): Turbidity shows increased protein.

Quantitative.—Send 4 cc. to Central Laboratory.

Specimen for Culture

Send 2 to 5 cc. cerebrospinal fluid in a sterile tube to the Central Laboratory. Specimens suspected of containing meningococci should be kept at 37° C., or immediately taken to the Board of Health Laboratory.

Section 3: Exudates, Transudates and Pus

Note source, amount withdrawn, appearance, and specific gravity of clear fluids after cooling to room temperature.

Bacteria

Make direct smear of sediment after centrifugalization; allow slide to dry slowly without applying heat. Stain with Gram's stain, Ziehl-Neelsen stain, or methylene blue (See **Section 7; Staining Methods**).

Fungi.—Mix well a drop or two of fluid with a few drops of 10 per cent sodium hydroxide solution; cover with cover glass.

Coagulation

Note spontaneous clotting without addition of citrate or oxalate.

Culture and Animal Inoculation

Pleural and Peritoneal Effusions.—Place fluid directly in sterile citrate solution to prevent clotting, especially if a guinea-pig inoculation is required.

Other Specimens.—Collect in sterile tubes, obtaining sufficient quantity for adequate examination. If material is collected on swabs, send at least 2 swabs; for gas-gangrene cultures, send at least 4 swabs. Send 5 cc. or more of other pus whenever possible.

Cytology

Count cells in counting chamber, making dilution, if necessary.

Stain sediment for differentiation of cells.

Malignant cells: Send to pathology laboratory 100 cc. to 2 liters of fluid, depending on amount of sediment present; citrate or oxalate must be added to prevent clotting in certain fluids. Specimen must arrive in the pathology laboratory immediately after withdrawal.

Protein

Qualitative Test (Rivalta).—Use 1 drop of glacial acetic acid to 100 cc. of water in a cylinder. Add a drop at a time up to 0.3 to 0.5 cc. of fluid and watch for smoky streak of protein.

Quantitative Estimation.—Dilute 1 part of fluid with 10 or 20 parts of distilled water, acidify with glacial acetic acid, and perform Tsuchiya's test (Section 8: Urine). Report in grams per liter, making correction for dilution. The dilution should have been made to yield a result of not over 4 Gm. per liter to insure accuracy.

Section 4: Feces

Chemical Tests

Biliary Pigments

Schmidt's Test.—Triturate a small quantity of fecal matter with 3 to 4 times its volume of saturated mercuric chloride solution. Color may appear in less than 1 hour, or may take 24 hours. Red denotes urobilin, and green, bilirubin.

Urobilin.—Acidify alcolholic extract of a fat-free watery suspension; neutralize with ammonium hydroxide solution; proceed as in Schlesinger's test (Section 8: Urine).

Blood, Occult

Suspend a small amount of stool in water and extract fat with ether; discard ether; acidify suspension with acetic acid; make ether extract. Prepare a fresh alcoholic solution of gum guaiac or benzidine and mix with an equal part of hydrogen peroxide solution. Overlay this mixture with the ether extract; intense blue ring, if positive. A faint reaction is considered negative unless the patient has been on a diet free from meat and leafy vegetables.

Cultures

If typhoid fever or dysentery is suspected, send specimens to Board of Health Laboratory.

Dysentery Culture.—Place mucus flake immediately after it is discharged in stool on eosin-methylene blue plate secured from the Board of Health Laboratory.

Microscopic Examination

Fats, Fatty Acid Crystals, Etc.

A thin emulsion is mixed with Sudan III; fat is stained red.

Nuclear Structures

Undigested meat fibers, etc.: treat with 30 per cent acetic acid solution and heat gently.

Parasites

Concentration Method.—Mix about 1 Gm. of feces with 5 cc. of 5 per cent acetic acid solution; emulsify; filter through 2 layers of gauze. Add an equal volume of ether, mix well and centrifugalize. The ether extract may be used for occult blood test; the sediment is used for microscopic examination for cysts, ova, etc.

Direct Smear Method.—Prepare several slides from feces diluted with distilled water, thin enough to read ordinary print through it; apply a cover glass to each and examine microscopically.

Prepare thick smears; let them dry; add Canada Balsam and cover with a cover glass.

Iodine-Eosin Method (Kofoid-Donaldson).—The smear is prepared for microscopic examination by rubbing out a minute bit of the feces, or the sediment from the **Concentration Method** above, and rolling it on a round applicator stick in a small drop of physiologic salt solution and then in an adjacent drop of iodine-eosin stain. A single cover is placed on both drops and the smear is ready for immediate examination. Living flagellates and unstained cysts appear in the unstained part. In the stained area, the cysts and non-motile flagellates, bacteria, fecal particles, and intestinal yeasts stain at once.

Stained Smears

Gram's stain for predominating organisms (See **Section 7: Staining Methods**).

Ziehl-Neelsen stain for acid-fast bacilli should be made on selected material, preferably mucus and pus (see **Section 7: Staining Methods**).

Starch Cells, Cysts, Yeasts, Fungi, Etc.

A thin emulsion is mixed with Lugol's solution. Starch cells are blue.

Section 5: Gastric Contents

For special procedures for stimuli and collection of specimens see **Part II, Section 8.**

Chemical Examination

Hydrochloric Acid, Free

Quantitative Estimation.—To 5 cc. of filtered gastric contents, add 20 cc. water, and 5 drops of Topfer's reagent (dimethylamidoazobenzol 0.5 Gm. in 100 cc. alcohol). If free hydrochloric acid is present, a cherry-red color appears. Titrate with $^{N}/_{10}$ sodium hydroxide solution until a distinct lemon-yellow color is obtained. Express as cc. of $^{N}/_{10}$ acid in 100 cc. gastric juice.

Lactic Acid

Qualitative Test.—Use a fasting specimen only. Dilute a few drops of 10 per cent ferric chloride solution with sufficient distilled water to obtain a faint yellow color. Divide the mixture between two test tubes. To one add a few drops of gastric juice (fasting). If lactic acid is present, a canary-yellow color appears. An ether extract may be used for this test.

Total Acidity

Quantitative Estimation.—Add 2 drops of 1 per cent phenolphthalein solution to the titration for free hydrochloric acid and continue titration with $^{N}/_{10}$ sodium hydroxide solution to a permanent red color. Calculate the amount of total $^{N}/_{10}$ acid, using the reading before the first titration.

Microscopic Examination

Make a fresh preparation and stain a slide for study of formed elements.

Section 6: Sputum

Amount (in 24 hours)

Avoid collecting saliva and mucus from oral passages, and collecting foreign material.

Appearance, Gross

Mucoid, mucopurulent, purulent, bloody, etc.

Culture

Collect specimen in a sterile bottle, avoiding contamination by saliva and mucus from oral passages, foreign material, and vomitus.

Send specimen to the Central Laboratory immediately.

Stained Preparations

Pneumococci, Streptococci, etc.—Use Gram's stain (See Section 7: Staining Methods), methylene blue, or the following: Welch's capsule stain for pneumococci: Fix with glacial acetic acid, flood with

gentian violet for 3 to 5 minutes, wash off dye with 2 per cent sodium chloride solution and mount wet with coverslip. Do not use heat or water.

Spirochetes.—Make a thin smear; stain with diluted carbolfuchsin or gentian violet solution for 3 to 10 minutes. Wash well. A dark field examination may be made on a fresh specimen, which should be brought immediately to the Central Laboratory. Cleansing of the mouth and teeth should precede the collection of the specimen for this examination.

Tubercle Bacilli

Concentration Method.—Use equal parts of Paterson's antiformin solution (50 per cent) and sputum; incubate 2 to 24 hours or heat for 30 minutes; centrifugalize. Stain the sediment.

Gastric Washings.—These may be used from patients from whom sputum is not obtainable; stain same as sputum above.

Guinea Pig Inoculation.—Send morning or 24-hour specimen in a sterile bottle to the Central Laboratory.

Send Specimen to Board of Health Laboratory.

Ziehl-Neelsen Stain.—Use selected material (See Section 7: Staining Methods).

Unstained Slide Preparations

Add a few drops of 10 per cent sodium hydroxide solution for elastic tissue, Curschmann's spirals, crystals, yeasts, molds, coccidioides, parasites, and myelin globules.

Section 7: Staining Methods

Carbolthionin Stain

This stain is especially useful for finding B. influenzae in smears of cerebrospinal fluid. Same as for Methylene Blue Stain.

Gentian Violet or Carbolfuchsin Stain

For spirochetes and fusiform bacilli.

Stain 5 to 10 minutes with gentian violet solution, being careful that the dye does not dry on the slide. Wash very well with water.

Gram's Stain

Make a thin even smear of the material on a glass slide; dry in air and fix gently (the slide must not become warmer than will feel comfortable to the back of the hand). Rapid drying and excessive heat must be avoided. Slide must be cool before the stain is applied. Cover slide with solution of gentian violet for 1 minute;

wash well with water. Cover slide with Gram's iodine solution for 1 minute; wash well with water. Pour off excess water and decolorize with 95 per cent alcohol or with alcohol-acetone mixture until no more gentian violet is rinsed off. Wash well with water immediately. Counterstain with safranin solution for 1 minute. Wash well with water. Blot or drain dry. Gram-positive organisms are purple. Gram-negative organisms are pink. Pus cells are Gram-negative.

Methylene Blue Stain (Loeffler's)

Make a thin smear according to directions under **Gram's Stain.** Stain 1 to 2 minutes with methylene blue solution. Wash well with water. Gram-negative bacilli do not usually stain well with this stain. Do not rely upon this stain for gonococci in uretheral or vaginal smears.

Methylene Blue (or Ponder's) Stain

For B. diphtheriae. Same as for **Loeffler's Methylene Blue Stain.** The metachromatic granules stain red to purple.

Ziehl-Neelsen Stain for Acid-fast Bacilli

Make a thin smear of the material on a slide; dry in air and fix gently (See **Gram's Stain**). Avoid excessive heat and rapid drying.

Rapid Method.—Cover slide with carbolfuchsin solution; heat gently to steaming and continue steaming for 3 to 10 minutes. Do not boil the stain. Do not allow the stain to dry on the slide. Replace evaporated stain with distilled water. Wash well with water.

Slow or Cold Method.—Place slide in jar of carbolfuchsin solution and allow it to remain for 2 to 24 hours. Wash well with water.

Decolorize with acid alcohol (3 per cent hydrochloric acid in 70 per cent ethyl alcohol) until the thinnest parts of the smear are only a pale pink. (Acid-fast bacilli can not be over-decolorized). Wash well with water.

Counterstain.—Flood the slide with water and add 4 to 5 drops of methylene blue solution for 1 minute. Wash well with water. Drain dry; do not blot.

Section 8: Urine

Drugs and Solutions Which Interfere with, or Give False, Reactions With Urinary Tests

Acetone

Alcohol, aldehyde and diacetic acid.

Bile

Thymol interferes.

Dextrose

Alkapton bodies, when greatly increased.

Chloral, formaldehyde, aldehyde, creatine and uric acid, when present in large amounts.

Chloroform, a reducing agent.

Urates give gray precipitate.

Hemoglobin

Pus gives false positive reactions.

Indican

Thymol and formaldehyde interfere.

Medication

Antipyrine interferes with tests for bile.

Bromides, iodides, and copper interfere with tests for hemoglobin unless ether extract is used.

Naphthalin, chrysarobin, opium, phenol derivatives, and cinchophen (atophan) give false diazo reactions.

Phenol, salicylates (salol, etc.), antipyrine, and sodium bicarbonate give reactions for diacetic acid.

Potassium iodide gives a red color in the test for indican.

Salicylates give a violet and pink color in the test for indican.

Tannic and gallic acids, tannigen, and tannalbin prevent the diazo reaction.

Turpentine gives false positive reactions for albumin in the acetic acid test.

Preservatives

Generally interfere (See below).

Urobilin

Bilirubin is precipitated by Schlesinger's reagent and interferes with test; remove it with 10 per cent calcium chloride solution.

Eosin and other fluorescent compounds.

Preservatives

Chloroform

Cover bottom of bottle; a reducing agent; not satisfactory for casts; easily removed by boiling.

Formalin (40 per cent formaldehyde solution)

Five to 8 drops per liter; interferes with chemical tests; satisfactory for casts and cells.

Thymol

Add few crystals; interferes with chemical tests; satisfactory for casts and cells.

Toluol

Add enough to form a thin layer; does not interfere with tests; easily removed on a hot water-bath.

Acetone

To 10 cc. urine add 0.5 cc. glacial acetic acid and a few crystals of sodium nitroprusside; shake. Overlay with concentrated ammonium hydroxide: A reddish-purple ring, if positive.

Albumin

Qualitative.—Clear urine by centrifugalization, if necessary, heat in test tube to boiling, acidify with few drops of 3 per cent acetic acid solution; heat again; a cloud appears, if positive.

Overlay 1 volume of yellow nitric acid with 3 volumes of urine: White ring at the line of contact, if positive.

Quantitative.—Use Tsuchiya's reagent (phosphotungstic acid, 1.5 Gm., hydrochloric acid, 5.0 cc. and alcohol, 95.0 cc.).

Acidify the urine, fill Esbach tube with urine to mark "U", add Tsuchiya's reagent to mark "R"; invert several times; set aside 18 to 24 hours; read in grams per liter; correct for dilution which should have been made to obtain about 4 Gm. per liter to insure accuracy.

To 4 cc. urine (Shevky-Stafford tube) add 2.5 cc. Tsuchiya's reagent; invert 3 times, let stand 10 minutes and centrifugalize 10 minutes at 1800 r.p.m. 7.2 times dilution times volume of precipitate times cc. urine in 12 hours equals mgm. protein in 12 hours.

Bile

Foam Test.—Shake about 5 cc. urine in test tube: yellow foam, if positive.

Gmelin's Test.—Layer equal parts of urine with yellow nitric acid: a green ring, if positive.

Smith's Test.—Acidify urine; add 1 per cent alcoholic solution of iodine: a green band, if positive.

Dextrose

Qualitative.—Use Benedict's qualitative solution (copper sulphate, 17.3 Gm., sodium citrate, 173.0 Gm., sodium carbonate, 100 Gm., in water, 1000 cc.). Mix 5 cc. of solution and 8 drops of urine; immerse in boiling water for 5 minutes. Let cool. Green color, 1+ or approximately 0.1 to 0.5 per cent concentration of dextrose; yellow ppt., ++or approximately 1 per cent; red ppt., +++ or 4 per cent or more.

Quantitative.—Use Benedict's quantitative solution (copper sulphate, 19.0 Gm., sodium citrate, 200.0 Gm., sodium carbonate, 200.0 Gm., potassium

sulphocyanate, 125.0 Gm. potassium ferrocyanide, 0.25 Gm. in water, 1000 cc.). Put 25 cc. of solution in flask with about 5 Gm. sodium carbonate; while gently boiling add urine from burette until decolorized.

Diacetic Acid

To 5 cc. fresh urine add 10 per cent aqueous ferric chloride, drop by drop, until precipitateis complete. Filter, and add more ferric chloride solution: deep red color, if positive.

Note.—Aminopyrine, antipyrine, phenacetine, salicylates (aspirin, salol, etc.), or sodium bicarbonate excreted in urine gives a similar color. Inquiry regarding medication should always be made.

To 5 cc. urine add 5 cc. of water and boil down to 5 cc. Boiling drives off the diacetic acid. If reddish-purple color still remains, it is indicative of the presence of other substances.

Sediment

Centrifugalize 15 cc. urine and pour off to about 0.5 cc. Resuspend sediment and examine microscopically under cover glass. Report number of formed elements in a dry field under high power.

Urobilin

Schlesinger's Test.—To 10 cc. urine add a few drops of Lugol's solution (Compound Solution of Iodine, U.S.P.) and add 10 cc. Schlesinger's reagent (saturated alcoholic solution of zinc acetate). Mix and filter. A greenish fluorescence appears, if positive; more easily seen in sun-light, or by the aid of a pocket flash-light. Positive reactions in dilutions of 1 to 20 parts or more may be considered pathological.

When bile is present, remove it by adding 2 cc. 10 per cent calcium chloride solution to 8 cc. urine, and filtering. Use filtrate for Schlesinger's test.

Urobilinogen

Wallace-Diamond Test.—To 10 cc. fresh urine at body temperature add 1 cc. Ehrlich's reagent (paradimethylaminobenzaldehyde, 2 Gm., concentrated hydrochloric acid, 25 cc. and distilled water to 100 cc.): cherry-red color, if positive. The color is seen best when looking down through the test tube against a white background. Positive reactions in dilutions greater than 1 to 20 parts may be considered pathological. Bile interferes with the test and should first be removed as in **Schlesinger's Test for Urobilin.**

Aschheim-Zondek Test

Collect morning, or 24-hour, specimen. Toluol may be added as preservative for 24-hour specimen.

Concentration Test (Addis)

The patient is to be dehydrated by dry diet, and no fluid is to be taken for 24 hours, beginning at breakfast time. The 12-hour night urine is to be collected, the day urine being discarded. Note the time of the last discarded day specimen and the last night specimen collected and the correct volume for 12 hours, if necessary. Determine reaction, specific gravity, total protein in 12 hours, and centrifugalize one-one hundredth ($^1/_{100}$) of the 12-hour volume in special Addis tubes. Pipette off supernatant urine to 0.4 cc., suspend sediment, mount in counting chamber, and count 4 large corner squares. Number of formed elements in 4 squares times 100,000 gives the number in 12 hours. Count red blood cells, white blood cells, epithelial cells, and casts with differential as to types. **Normal maximum number of formed elements in 12 hours:** red blood cells, 1,000,000; pus and epithelial cells, 1,000,000; casts, 5,000. **Total protein:** 30 mgm. in 12 hours. **Average volume:** 400 cc. **Average specific gravity:** 1.028.

Culture

Send 10 cc. or more of catheterized urine in a sterile tube to the Central Laboratory.

If typhoid fever is suspected, send to the Board of Health Laboratory 10 cc. of a 24-hour (complete) sample.

Diazo-reaction (Ehrlich)

Reagent No. 1 contains sulphanilic acid 1 Gm., hydrochloric acid concentrated, 10 cc., in 200 cc. water. Reagent No. 2 contains sodium nitrite 0.5 Gm. in water, 100 cc. Mix well 10 cc. of reagent No. 1 with 0.1 cc. of reagent No. 2 in a test tube. To 5 cc. of this mixture add an equal volume of urine, mix and carefully overlay with 1 or 2 cc. of ammonium hydroxide solution. If positive, a garnet red (eosin pink to deep crimson) color appears at the line of contact, and on shaking a distinct pink color is imparted to the foam.

Hemoglobin

Acidify about 10 cc. urine with 3 to 4 cc. glacial acetic acid; after several minutes extract with ether. Prepare a fresh alcoholic solution of gum guaiac or benzidine and mix with an equal part of hydrogen peroxide solution. Overlay this mixture with the ether extract; bright blue ring, if positive.

Indican

To about 5 cc. urine add an equal volume of Obermayer's reagent (ferric chloride, 2 Gm., in hydrochloric acid, 100 cc.). Heat until test tube is warm. Add 2 cc. chloroform and mix: blue color in chloroform layer, if positive.

Melanin

To 10 cc. urine add a few drops of 10 per cent aqueous ferric chloride: gray color. Further addition of ferric chloride solution produces a dark precipitate consisting of phosphates and adhering melanin. An excess of ferric chloride solution dissolves the precipitate.

Mercury (Other Heavy Metals and Poisons) Tests and Determinations

Reinsch's Test.—A piece of arsenic-free copper foil, or a thoroughly cleaned penny, is introduced into the urine which has been acidified with one-fifth its volume of chemically pure (analyzed) hydrochloric acid. The mixture is warmed to 50° or 60° C., and set aside for 12 hours, or preferably 24 hours. Metallic mercury is deposited on the foil or penny as a bright lustrous mirror.

Quantitative Determinations of Heavy Metals and Poisons.—Send 24-hour urine specimen to the Board of Health Laboratory for determination of heavy metals and poisons.

Renal Function Tests

Concentration Test (Modified Volhard's).—The diet used is the one to which the patient is accustomed, although the fluid intake must be limited to 200 cc. (1 glass). Allow nothing to be taken by mouth between meals and from the evening before the test until the test is finished. All urine voided between 7 P. M. and 7 A. M. is collected as one specimen. The patient remains in bed and voids at 8 A. M. and at 9 A. M. Measure the specific gravity of each specimen. One of the three readings should be 1.024 or higher.

Concentration Test (Mosenthal).—On the day of the test and preferably also on the day before, place the patient on a full diet (ordinary hospital diet). At least a pint of fluid (tea, coffee, water, etc.) must be taken at each meal; no food or liquid of any sort may be taken outside of these meals until after the test is completed at 7 o'clock the following morning. Instruct the patient to empty his bladder immediately before breakfast (at 7 A. M.). Collect specimens of urine at 9 A. M., 11 A. M., 1 P. M., 3 P. M., 5 P. M., 7 P. M., and at

exactly 7 A. M. the following morning. It is essential that the intervals be exact and the bladder be completely emptied each time. The last of the 2-hour specimens should be collected not more than 3 hours after the beginning of the evening meal. All the specimens after 7 P. M. (to 7 A. M.) are collected as one specimen.

Measure the night urine and determine its specific gravity. Measure the six 2-hour specimens separately and determine their specific gravity, first making sure that all are at the same temperature. **Normal:** Volume of night urine, 250 to 350 cc.; seldom exceeds 400 to 500 cc.; maximum, 750 cc. Specific gravity usually will be 1.018, or higher. The highest specific gravity recorded for the 2-hour day specimens should exceed 1.018, while the difference between the highest and lowest should not be less than 8 to 9 in the third decimal place.

Phenolsulphonephthalein Test.—During an hour preceding the test, the patient is given 1000 cc. of water. When ready to begin the test, the patient empties the bladder. All patients who are unable to void at proper intervals should be catheterized. Patients in whom a urinary retention is suspected should be catheterized and the residual urine measured. Leave the catheter in place, closed by a hemostat or clamp.

Inject intravenously exactly 1.0 cc. of phenolsulphonephthalein solution with a tuberculin syringe. If the catheter is in place, leave the end of it in a bottle containing a few drops of 10 per cent sodium hydroxide solution. At the end of 5 minutes, collect urine and watch for the appearance of the dye, noting change to a pink color. If the change does not occur at the end of this period, collect specimens at 7 minutes after the injection and again at 10 minutes. When the color change occurs, note the time and record it as "appearance time." The normal period is 5 minutes or less. Collect voided or catheterized specimens of urine at 30, 60, 90, and 120 minutes after the injection of the dye; alkalinize specimens with 10 per cent sodium hydroxide solution and dilute each specimen to 1000 cc. Estimate the amount of dye in each specimen by use of a Dunning or Duboscq colorimeter. Normal excretion should show 50 per cent or more of the dye in the 30-minute specimen.

Urea Clearance Test (Addis' Ratio).—Let the patient take sufficient water (300 to 500 cc. each hour) so as to be excreting about 2 cc. urine per minute. Request the patient to empty the bladder

and collect two hourly specimens, noting the exact time. Collect a blood specimen for urea determination at the time of the first urine specimen. Send the specimens to the laboratory for urea determinations.

Calculation:

$$\frac{\text{mgm. urea excreted in 1 hour}}{\text{mgm. blood urea in 100 cc.}} = \text{urea clearance in 100 cc. (blood cleared) per hour}$$

PART II

Procedures in Diagnosis

Section 1: Board of Health and Hospital (San Francisco) Regulations Concerning Certain Specimens

Board of Health Regulations

All specimens for bacteriological and serological diagnosis of communicable diseases must be sent to the Board of Health Laboratory.

Acid-fast Bacilli in Sputum.—A positive report must be received from the Board of Health Laboratory before transfer of a patient to the Tuberculosis Division can be made.

Diphtheria Throat Cultures: Routine on admission.

Gonococci: Vaginal, cervical and urethral smears (See Hospital Regulations, below).

Meningococci in Cerebrospinal Fluid and Blood: Cultures.

Treponema pallida: Darkfield examination.

Typhoid Fever and Dysentery: Cultures of blood, feces, and urine specimens.

Wassermann and Kahn Tests: Blood and cerebrospinal fluid. Those on blood are routine on admission to a ward.

Whooping Cough: Cough plates.

Widal and Other Agglutination Tests: (See Section 7: Serology and Blood Typing).

Hospital Regulations Regarding Smears for Gonococci

On the obstetrical wards, the intern is required to make two vaginal and two urethral smears immediately on admission of patient. One set is to be stained by Gram's stain; the other set is sent to the Board of Health Laboratory. If the smear is found by the intern to be positive, it is to be checked by the House Officer, and reported to the Office of the Superintendent. "In female children, in addition to the usual throat culture

made at the time of admission, a vaginal smear will be made and sent to the Department Laboratories. All incoming children will be held in observation units for an isolation period of a minimum of 48 hours. Three vaginal smears, 24 hours apart including the smear at the admission desk from the female children will be sent to the Department Laboratories." (Hospital Order No. 19).

The above procedures are considered routine on other services, especially the gynecological wards.

Section 2: Bacteriological Specimens

In any focal infectious process, the making of an immediate direct smear for bacteriological examination is most important and should always be labeled and saved for confirmation by the smear and culture reports from the Central Laboratory.

Blood Cultures

From the Central Laboratory, secure a syringe which has been sterilized in an autoclave, and a flask of sterile sodium citrate solution.

Wash hands.

Preparation of the patient: Palpate to find a satisfactory antecubital vein. Prepare the site of the needle puncture by applying Tincture of Iodine (except on children) well over the area. Allow it to dry. Wipe with 70 per cent alcohol. Do not touch the cleaned surface again.

Obtain 12 to 15 cc. blood; remove the needle from the syringe, and place the blood into the sterile citrate solution. Shake the flask well. Send to the Central Laboratory immediately.

If the Central Laboratory is closed, use a syringe which has been boiled for 20 minutes and kept aseptic. Use a bottle of media instead of the citrate solution, and place culture into an incubator immediately.

If typhoid fever is suspected, a blood culture must be sent to the Board of Health Laboratory also, in a flask obtained from that laboratory.

Section 3: Blood Chemistry

All specimens of blood are to be obtained after 14 hours of fasting unless otherwise indicated, or in cases of emergency.

Precaution.—The needle and syringe must be clean, sterile, and dry. Remove the needle from the syringe before transferring the blood from the syringe to the tube. When collecting blood for serum, care must be taken to prevent bubbles and foam from forming in the tube; they often cause hemolysis.

Routine Tests

Creatinine
Put 5 cc. blood in tube containing potassium fluoride or oxalate.

Icteric Index and Bilirubin
Put 10 cc. blood in plain tube.

Non-protein Nitrogen
Put 5 cc. blood in tube containing potassium fluoride or oxalate.

Sugar
Put 5 cc. blood in tube containing potassium oxalate or fluoride. (The potassium fluoride prevents glycolysis as well as clotting.)

Urea
Put 5 cc. blood in tube containing potassium oxalate.

Special Tests

Calcium and Phosphorus
Put 10 to 12 cc. blood in plain tube.

Carbon Dioxide
Put 10 cc. blood in potassium oxalate under oil.

Chloride, Plasma
Put 10 cc. blood in potassium oxalate under oil.

Cholesterol
Put 12 cc. blood in tube containing potassium oxalate.

Congo Red Test for Amyloidosis
When the patient is fasting, inject intravenously 1 cc. of 1 per cent Congo Red 4B solution for each 10 pounds of body weight. In 5 minutes obtain 10 cc. blood (do not use the same syringe that has been used for the injection of the dye) and place the blood in a tube containing potassium oxalate. One hour later (65 minutes after the injection of the dye) remove another 10 cc. specimen of blood and place in an oxalate-tube. Obtain urine specimens at the same time periods as the blood specimens. Send all specimens to the Central Laboratory immediately following the completion of the test.

Dextrose Tolerance Test
Obtain a fasting blood-sugar and urine specimen. Then give 100 Gm. dextrose in water by mouth. Obtain a specimen for blood-sugar after 30 minutes, 1 hour, 2 hours, and 3 hours. Also obtain urine specimens at the same intervals to determine the urinary threshhold.

Dextrose Tolerance Test for Liver Function, Modified

Obtain a fasting blood-sugar specimen. Administer 20 units insulin intramuscularly; 20 minutes later give 50 Gm. dextrose dissolved in 500 cc. water by mouth, followed by an additional 1000 cc. water. Obtain specimens for blood-sugar after 30 minutes, 1 hour, 2 hours and 3 hours. In case an insulin reaction develops during the test, the last sample of blood is taken at the time of the reaction regardless of schedule, and the patient is treated for hypoglycemia by giving dextrose by mouth, or intravenously.

Rose Bengal Test for Liver Function

When the patient is fasting, inject intravenously 10 cc. 1 per cent solution of Rose Bengal, using 30 seconds for the injection and being especially careful to prevent any solution entering subcutaneously. From the other arm, obtain 10 cc. blood 2 minutes after the completion of the dye-injection. Put the blood in a tube containing oxalate and keep it in a dark place. Six minutes after the first specimen (or 8 minutes after the injection of the dye) obtain a second specimen of blood and place it in an oxalate-tube. Repeat in 8 minutes (or 16 minutes after the injection of the dye). It is necessary to rinse the syringes used in taking the blood specimens in a solution of potassium oxalate before using. All specimens should be protected from light. Take to Central Laboratory immediately. It is necessary to keep the patient out of direct sunlight for the remainder of the day.

Total Protein and Serum Albumin-Globulin Ratio

Put 10 cc. blood in plain tube.

Uric Acid

Put 5 cc. blood in tube containing potassium fluoride or oxalate.

Section 4: Cutaneous Reactions

Allergy Tests

Echinococcus.—Inject intradermally 0.1 cc. of the undiluted antigen. Make a control test with 0.1 cc. of physiologic salt solution. When positive, the reaction begins almost immediately; observe in 5, 10, 20, and 30 minutes. A delayed reaction is observed in 18 to 24 hours and a positive response is shown by infiltration and edema, about 5 cm. (2 inches) in diameter at the site of injection.

Intradermal Test for Sensitivity to Serum.—Inject intradermally 0.1 cc. of the serum, diluted 1 to 10 parts or more. This is applicable to therapeutic

anti-serum before giving it intramuscularly or intravenously; a positive reaction occurs in 5 to 20 minutes as indicated by an area of erythema and swelling, and by a general systemic reaction.

Patch Test.—Place a mass of the substance to be tested, 3 to 6 m.m. ($\frac{1}{8}$ to $\frac{1}{4}$ inch) in diameter, on a piece of filter paper, about 2.5 c.m. (1 inch) square. If the test substance is a solution, merely immerse the filter paper in it and apply to the upper arm or forearm where there is no existing dermatitis; hold firmly in place by wide strips of adhesive tape. Several tests may be applied at the same time. Leave undisturbed for 24 hours unless discomfort from irritation develops sooner. Observe in 24 to 48 hours. Occasionally reactions occur after 10 days. A positive reaction is indicated by an eczema consisting of redness, swelling, papules and vesicles.

Trichinosis.—Inject intradermally 0.1 cc. antigen, diluted 1 to 10,000 parts. Make a control test with 0.1 cc. physiologic salt solution. When positive, the reaction begins almost immediately; observe in 5, 10, 20, and 30 minutes. If this test is negative, repeat with 0.1 cc. antigen diluted 1 to 500. This test is positive in other worm infections, especially **Trichiuris.**

Toxin Tests

Scarlet Fever Tests

Dick Test for Susceptibility.—Inject intradermally 0.1 cc. diluted Dick toxin. A control is not used. A positive reaction usually appears in 18 hours and starts to fade 12 hours later. It consists of a red blush 13 m.m. ($\frac{1}{2}$ inch) or more in diameter about the site of injection. Note the size of the erythematous patch.

Schultz-Charlton Test for Diagnosis.—Inject intradermally into an area of bright rash 0.25 cc. Scarlet Fever Antitoxin or Scarlet Fever Convalescent Serum (the latter does not need a control). Examine in 4 to 6 hours for blanching of the rash, 12.5 m.m. to several cm. ($\frac{1}{2}$ to a few inches) surrounding the site of the needle puncture. The margin is usually sharply defined. If the rash is old, blanching will not occur. Positive blanching may be masked if the patient is hypersensitive to horse serum. Therefore, if the commercial scarlet fever antitoxin is used for the test, make another test with the antitoxin in an area where there is no rash.

Schick Test for Susceptibility to Diphtheria

Inject intradermally 0.1 cc. Schick toxin and Schick control, one on each arm. These dilutions must be made fresh (use within 24 hours of preparation). Positive reactions: Area of erythema in 24 to 48 hours. The reaction in the control test occurs and disappears sooner than the reaction to the diphtheria toxin. It is important to inject the material intradermally and to obtain a good white wheal; deep injections usually give negative or false reactions.

Miscellaneous

Frei Test.—This is diagnostic for lymphogranuloma inguinale. Inject intradermally 0.1 cc. Frei's antigen. No control is used. A positive reaction: Area of erythema in 24 to 48 hours. Induration often occurs. Make a control test on another individual.

Tuberculin Test (Mantoux Intradermal Test).—Inject 0.1 cc. of 1:1000 O.T., intradermally in order to raise a white wheal. (Initial dose of 0.1 cc. of 1:10,000 in patients who have had recent hemoptysis, ophthalmic, skin, or joint tuberculosis). A nonspecific reaction may take place in 24 hours. The test-result is observed in 2 to 4 days. Positive reaction: Area of erythema of 1 cm. or more in diameter. Marked reactions occur occasionally with swelling and necrosis. When the reaction is negative to 1:1000, repeat with 0.1 cc. of 1:100. Control solutions are not used in dilutions greater than 1:10.

Tularemia and Brucelliasis.—Make skin tests. Obtain antigens from Hooper Foundation. Inject 0.1 cc. intradermally. Observe in 36 to 96 hours.

Section 5: Pathological Specimens

Paracentesis fluids for examination for malignant cells (See **Part I. Section 3: Examination of Exudates, Transudates and Pus.**)

Surgical and Biopsy Specimens

Place specimen in 10 per cent formalin (40 per cent formaldehyde solution) immediately and send to Pathology Laboratory with all essential clinical data. It is imperative that a properly filled out request slip accompanies each specimen.

Section 6: Punctures, Diagnostic

Cisternal Puncture

Equipment: Syringe, hypodermic and intramuscular needles, 1 per cent procaine solution,

spinal needle (18 gauge, 7½ cm. long), manometer, and specimen tubes.

Procedure.—Shave site (skin) at base of occipital protuberance about 3 cm. in diameter. Let patient lie on side with head supported on pillow so spine is horizontal. Mark site just below occipital protuberance, with end of applicator, and apply suitable skin antiseptic. Make wheal with 1 per cent procaine and infiltrate local antiseptic deeply. With head flexed, insert needle just below bone, pointing forward to center of forehead between brow and scalp line (for Stanford University service), or pointing forward to external canthus of the eye (for University of California service). The needle will scrape along bone and then feel free when foramen magnum is reached. Proceed slowly, with manometer attached, and cisterna will be entered between 4 to 6 cm. Negative pressure indicates dura is being pushed in front of needle and great care should be exercised. Fluid may be withdrawn, comparative effects of jugular compression on cisternal puncture and lumbar puncture may be noted, and through and through irrigation with simultaneous lumbar puncture may be done as indicated.

Lumbar Puncture

Equipment: Same as for Cisternal Puncture.

Procedure.—Patient should be placed on side on a table, supported so as to have an approximately horizontal spine and flexed so that the head and knees approach each other. Mark site between spines of fourth to fifth or third to fourth lumbar vertebrae, disinfect and anesthetize as for Cisternal Puncture. Insert spinal needle, keeping in midline and pointing 10 to 15 degrees toward the head. Just before the canal is reached, withdraw the stylet and attach manometer in order to get accurate pressure readings. The patient should be relaxed while taking the pressure, in which case it will be 10 to 12 cm. of water with the patient in horizontal position. For the Queckenstedt test, compress each and both jugular veins, noting rise and fall of pressure. This test is contraindicated in the presence of bloody spinal fluid. Withdraw fluid for the following tests, the first four being routine:

Cytology, 1 cc.
Pandy's test, 1 cc.
Colloidal Gold (Lange) test, 1 cc. in special tube; send to Central Laboratory.

Wassermann test, minimum quantity, 2 cc.; send to Board of Health Laboratory.

Culture, 2 to 10 cc. in sterile tube; send to Central Laboratory. Specimens in which meningococci are suspected should also be sent to the Board of Health Laboratory.

Sugar, 3 cc., with simultaneous blood sugar specimen; send to Central Laboratory.

Chlorides, 4 cc.; send to Central Laboratory.

Protein (quantitative), 4 cc.; send to Central Laboratory.

Combinations of tests may be made on 6 to 8 cc.

Paracentesis, Abdominal

Equipment: 1 per cent procaine solution, small syringe with hypodermic and intramuscular needles, scalpel, gallbladder trocar-tube.

Procedure.—The site chosen is usually midline between the umbilicus and symphysis. Request the patient to empty urinary bladder, or catheterize in retention just before procedure. Mark site, prepare with skin antiseptic, infiltrate with 1 per cent procaine solution, incise the skin with a scalpel and push trocar through the abdominal wall. It is frequently necessary to use sudden thrusts as the wall gives way so easily. Withdraw the stylet and let fluid flow into flask or bucket. A voluminous dressing is frequently necessary, since leakage following the procedure is not unusual. If culture or guinea pig inoculation is indicated, collect 10 cc. in a sterile flask for culture, or 200 to 500 cc. for inoculation.

Pericardial Tap

Equipment: 1 per cent procaine solution, small syringe with hypodermic and intramuscular needles, 50 cc. syringe with valve and needle 16 gauge and 7½ cm. long. Potain's aspirator set with bottle or sterile flask.

Procedure.—The site may be anterior, within the apex, localized by X-ray, usually about the sixth intercostal space, or in massive collections posterior, at the tip of the scapula. The site should be marked, with end of applicator, the skin should be disinfected, followed by wheal and infiltration with 1 per cent procaine. The needles are introduced with constant suction and the fluid withdrawn as desired. A specimen of 10 to 100 cc. may be collected in a sterile tube or flask for examination and culture.

Thoracentesis

Equipment: Same as for Pericardial Tap.

Procedure.—In massive collections of fluid, the conventional site of puncture is in the posterior axillary line in the seventh to eighth intercoastal space. In localized collections, the physical findings and X-ray will determine the site.

Mark site with end of applicator, disinfect the skin, make wheal with 1 per cent procaine solution and infiltrate deeply, not entering pleural space. A needle 7½ cm. long, 15 to 16 gauge, should be used, preferably with valve to prevent introduction of unknown quantities of air. Fluid may be withdrawn with 50 cc. luer syringe for diagnostic purposes. For examination of fluid, see under **Lumbar Puncture.**

Section 7: Serology and Blood Typing

Precaution.—Use a clean, sterile, and dry syringe. Remove the needle from the syringe before transferring the blood to a vial. Care must be taken to prevent bubbles and foam from forming in the vial; they often cause hemolysis. Whenever possible, do not obtain blood specimens within an hour after a meal.

Agglutination Test for Brucelliasis.

Put 5 cc. venous blood in a vial and send to the Board of Health Laboratory with a properly filled out request slip, giving details in the history.

Agglutination Test for Tularemia

This test is done only by special request and when a definite history indicates the necessity.

Put 5 cc. blood in a vial and send to the Board of Health Laboratory with a properly filled out request slip, giving the essential clinical data.

Blood Typing and Cross-agglutinating Procedures

Collection of Specimens.—Collect 4 to 5 drops blood into 4 cc. 1.5 per cent sodium citrate in physiologic salt solution. Shake well immediately and again just before using.

Collect 4 to 5 cc. blood in a plain, clean tube and permit clot to form.

Label each tube with patient's or donor's name, date and ward.

Typing.—If a professional donor is to be called, type the patient's cells immediately.

Typing serums are prepared in vials or in capillary tubes of which there are two kinds: Group 2 with red tips; Group 3 with black tips. Both correspond to the Moss classification. Break off the ends of the capillary tubes and place 1 drop of each type on a properly labeled slide. Welled slides are

not necessary. To each drop is added 1 drop or loopful of the cell-suspension. Tilt the slide carefully back and forth, and watch for agglutination. Check the clumping microscopically. The agglutination usually occurs in a few minutes. Record the type in the patient's chart.

Cross-Agglutination

When ready to set up the cross-agglutination tests, loosen the blood clot with a wooden applicator, and place the tube in a centrifuge. These long tubes fit the centrifuge guards. Recover the serum.

Place 1 loopful of the recipient's serum on a cover glass, add 1 loopful of the donor's cells in suspension, mix, and invert over a petrolatum-ring. On the other cover glass, place 1 loopful of the donor's serum and 1 of the recipient's cells. Examine under a low power lens of the microscope immediately and note the density of the cell suspension. Watch for clumping and for hemolysis. The slide may be tilted back and forth very carefully to accelerate clumping.

If no agglutination occurs immediately, place the slide in an incubator for 1 hour.

If agglutination takes place with either serum immediately or within an hour, the bloods are not compatible, and the donor cannot be used even if he is a Type 4. If the bloods are compatible, type both the donor and the recipient as a check.

The donor and recipient must be the same type. The universal donor (Type 4) may be used in extreme emergency only.

The House Officer on a service is responsible and should check the cross-agglutination tests.

Keep all serums and cell suspensions until the transfusion has been completed.

Wassermann and Kahn Tests

Put 5 cc. venous blood in a vial and send to the Board of Health Laboratory with a properly filled out request-slip.

Specimens of cerebrospinal fluid are also sent to the Board of Health Laboratory for these tests. The minimum quantity is 2 cc. of fluid.

Widal Test

This test includes agglutinations for B. typhosus, B. Paratyphosus A and B, and B. abortus.

Put 5 cc. venous blood in a vial and send to the Board of Health Laboratory with a properly filled out request-slip, giving details in the history.

Basal Metabolic Rate

Preparation of Patient.—No food, fluids, cathartics, sedatives, or stimulants after the evening meal. Bed rest until the test is completed.

Capillary Resistance Test (Hess)

Place the cuff of a sphygmomanometer above the elbow and inflate it until the pulse disappears at the wrist. Deflate until the pulse can be felt definitely by the palpating fingers and maintain it at this level for 5 minutes. Then release the pressure and request patient to elevate the arm above his head. This removes cyanosis; any petechiae may be clearly seen on the volar surface of the forearm, or the dorsum of the hand.

Catheterization

Equipment: Soft rubber catheter, 14 to 20 gauge, clamp, sterile lubricant, liquid soap, bichloride of mercury solution, sponges, and sterile gloves.

Procedure.—Hold body of penis between the third and fourth fingers so the glans may be steadied by thumb and index fingers. Cleanse with soap and bichloride of mercury solution. Seize catheter near tip with clamp, catching free end between fourth and fifth fingers. Lubricate the end and introduce with clamp, keeping penis on a stretch to prevent kinking of catheter.

Duodenal Drainage

Procedure.—A metal tipped tube (Rehfuss) is used. It is introduced into the stomach and the patient placed on his right side to permit normal peristaltic waves to carry the tip through the pylorus. The position of the tube is best checked by fluoroscopy at this time. The position may be estimated by the type of secretion aspirated. Fluid is aspirated and and 50 cc. saturated magnesium sulphate solution introduced. Aspiration is begun after 5 minutes and continued for 30 minutes for biliary specimens from common duct, gallbladder and liver, which are indicated by greenish yellow, brown, and light yellow colors, respectively.

Gastric Analysis

Equipment: Small syringe with hypodermic needle, 1 mgm. tablet of histamine, Levine gastric tube 14 to 18 gauge, 20 cc. syringe, 50 cc. 7 per cent alcohol and specimen bottles.

Procedure.—After a 12-hour fast, with no fluids, the chilled tube which may be lubricated with

mineral oil is introduced into the stomach by placing the tip at the base of the tongue, requesting the patient to swallow and to breathe through the mouth with shallow rapid respiration. It is gradually pushed down into the stomach and the fasting contents are aspirated, the patient being tipped at all angles and the tube pulled up and pushed down a short distance for complete evacuation. Save this material for the fasting specimen.

Gastric Stimuli

Histamine Phosphate (U.S.P).—Inject hypodermically 0.01 mgm. per Kg. of body weight (maximum total dose, 0.5 mgm.) and aspirate continuously for 40 minutes, closing specimens at 10, 20, 30, and 40 minutes.

Histamine and Alcohol Combination.—With the tube in place, introduce 50 cc. 7 per cent alcohol solution by means of a syringe. Aspirate specimens of 10 cc. every 20 minutes for 1 hour. If the third specimen does not contain any free hydrochloric acid, inject hypodermically histamine phosphate 0.01 mgm. per Kg. of body weight (maximum dose, 0.5 mgm.) and extract 2 gastric specimens, at 10 and 20 minutes following the injection.

Proctoscopy

Procedure.—Preparation of patient is preferably by salt solution enema, 6 to 12 hours preceding to minimize hyperemia of bowel. After digital examination, introduce lubricated proctoscope with patient in knee-chest, or Sim's position, pointing along the sacral curve. When sphincter is passed, withdraw obdurator and proceed under direct vision, inflating as necessary. Observe carefully before passing scope upward and never force the scope blindly.

Section 9: X-ray Orders

Barium Enema

Make out an "x-ray" request card. The orders will be then telephoned from the X-ray Department. These consist of:

Two ounces of castor oil at 4 P. M. on the evening preceding the examination. If castor oil is contraindicated, the Resident Roentgenologist should be notified.

Only a light diet until the examination is completed.

The patient is examined in the X-ray Department at 1:30 P. M.

Cystogram

Fill out an "x-ray" request card.

Arrange a suitable time with the "x-ray" technician.

Administer an enema immediately prior to the examination.

Inject the opaque medium through a catheter; sterile 10 per cent sodium iodide solution is usually used.

Gallbladder Visualization

Make out an "x-ray" card. The orders will then be telephoned from the X-ray Department. These consist of:

Dye Intravenously.—On the evening preceding the examination, the patient is to have a fat-free supper.

Inject the dye in 100 cc. or more of physiologic salt solution, intravenously. The injection should be made at about 6 P. M. and require a period of about 10 minutes.

Nothing by mouth until orders are telephoned from the X-ray Department.

Dye by Mouth.—On the evening preceding the examination the patient is to have a light supper.

At 6 P. M. administer 4 Gm. **iodeikon** in grape juice or other vehicle.

Nothing by mouth until orders are telephoned from the X-ray Department.

Gastro-Intestinal Series

Fill out an "x-ray" card. The orders will then be telephoned from the X-ray Department. These consist of:

Nothing by mouth after the evening meal of the night before the examination.

A preliminary meal of barium at 8 A. M.

The patient is examined in the X-ray Department at 1:30 P. M.

Pyelogram, Intravenous

Fill out an "x-ray" request card.

Arrange with the "x-ray" technician for a suitable time.

Dehydrate the patient for 18 hours prior to the examination.

Administer an enema immediately prior to the examination.

After the patient is on the table, inject the dye intravenously during a period of about 5 minutes.

DRUGS FOR DIAGNOSTIC PURPOSES

Careful judgment is necessary in deciding whether the value of information gained by use of the drug in question outweighs possible toxic risks.

Eye

Cocaine Hydrochloride: 1 to 2 drops of 1 per cent solution.

Eucatropine (Euphthalmine) (N.N.R.): 2 drops of 5 to 10 per cent solution.

Fluorescein Soluble (Disodium Fluorescein) (U.S.P.): (for detection of foreign bodies or corneal lesions) 1 or 2 drops of 2 per cent solution, followed by irrigation with physiologic salt solution.

Homatropine Hydrochloride (N.N.R.): 2 drops of 1 per cent solution.

Gastro-enteric Function

Alcohol: 50 cc. 7 per cent alcohol by mouth.

Barium Sulphate (for "x-ray" diagnosis): 100 to 150 Gm. in chocolate malted milk.

Histamine Phosphate (U.S.P.) (for collection of gastric juice): 0.5 mgm. subcutaneously.

Kidney Function

Phenolsulphonephthalein (N.N.R.): 1 cc. 0.6 per cent sterile solution intramuscularly or intravenously. For technique of test see N.N.R.

Pyelography

Diodrast (N.N.R.): 20 cc. of a sterile solution containing 7 Gm. to be given intravenously. Note precautions in N.N.R.

Hippuran (N.N.R.) (Sodium o-iodohippurate): 12 Gm. in 75 cc. in simple syrup for oral use. 25 cc. of a sterile solution containing 12 Gm. for intravenous use. 15 per cent sterile solution for pyelography by retrograde administration. 3 per cent solution for cystography by retrograde administration.

Neo-iopax (N.N.R.): 20 cc. of a sterile solution containing 15 Gm. for intravenous use. (Administer very slowly.) Note precautions in N.N.R.

Skiodan (N.N.R.): 2 Gm. per 6 kilograms body weight in 20 per cent sterile solution intravenously. 10 per cent sterile solution for retrograde pyelography. Note precautions in N.N.R.

Liver Function

[**Bromsulphalein**: 2 mgm. per kilogram intravenously.]

Iodophthalein, Soluble (U.S.P.) or **Tetiothalein Sodium** (N.N.R.) ("Iodeikon") for "x-ray" visualization: 3 to 3.5 Gm. in 24 to 28 cc. freshly distilled and sterilized water intravenously. 4 Gm. orally (8 capsules of 0.5 Gm. each) or in half-pint of grape juice. For details see N.N.R.

Phenoltetrachlorphthalein (N.N.R.): 50 to 400 mgm. intravenously.

Phentetiothalein Sodium (N.N.R.) ("Iso-iodeikon") for "x-ray" visualization: 40 mgm. per kilogram body weight in 8 per cent freshly distilled and sterilized water, intravenously. 4 Gm. orally (8 capsules of 0.5 Gm. each) or in half-pint of grape juice (Cole et al: J.A.M.A., 1928, 90:1111).

[**Rose Bengal** (Tetraiododichlorfluorecein): 100 mgm. in 10 cc. sterile physiologic salt solution intravenously (Delprat et al., Arch. Int. Med., 1924, 34:533)].

X-ray Visualization of Body Cavities

For iodized fats and fatty acids see N.N.R., and for discussion of dangers see Report of the Council on Pharmacy and Chemistry, J.A.M.A., 1932, 99:1946.

Chloriodized Rapeseed Oil (N.N.R.) ("Campiodol"): 20 cc. ampules of emulsion. Not for intravenous or intraspinal use.

Lipiodol (N.N.R.): 1 to 5 cc. from sterile ampules.

Lipiodol Radiologique Ascendant (N.N.R.): 10 per cent iodized poppy seed oil: 1 to 2 cc. sterile, heated to 40° C. for intraspinal use.

Lipoiodine (N.N.R.): 5 cc. from diagnostic ampules.

COMMUNICABLE DISEASE TECHNIQUE AND CONTROL

Principles: Prevent droplet infection of patient by patient and physical contact of patient with patient (direct infection).

Prevent transfer of infectious material from patient to patient by intermediate means, such as the hands, clothing, instruments and utensils of doctors, nurses, orderlies and maids, or toys passed from patient to patient (indirect infection).

Specific Precautions: Keep fingers, pencils, pens, etc., out of mouth.

Use private drinking glass.

Do not touch face or head with contaminated hands.

Be careful of patients coughing or sneezing in one's face.

Do not let patients touch one's face.

Put on gown when entering cubicle.

Wash hands before eating.

Scrub hands two minutes after working with patients.

For details of care of patients, order of cubicles, routine for clinical observations, collection of utensils, care of dishes, irrigating stands and equipment, disposition of patient's personal effects, care of the dead, ambulance technique, personal precaution for orderly, nurse, or employee, etc., see special instructions issued by the Superintendent of the Hospital.

WEIGHTS AND MEASURES

Metric and Apothecaries' Systems

Metric System	Approximate Apothecaries' Equivalent
1 milligram (mgm.)	1/60 grain
1 gram (Gm.)	15.0 grains
1 cubic centimeter (cc.)	15.0 minims
1 liter (L.)	33.8 fluidounces

Apothecaries' and Metric Systems

Apothecaries' System		Approximate Metric Equivalent	
1 minim	M	0.06	cc.
1 grain	gr	0 065	Gm.
1 scruple	℈	1.3	Gm.
1 fluidrachm	fʒ	4.0	cc.
1 drachm	ʒ	4.0	Gm.
1 fluidounce	fʒ	30.0	cc.
1 ounce	ʒ	31.0	Gm.
1 pint	O	475.0	cc.

Fractions of Grain	Metric Equivalents Gm.
1/2	0.03
1/3	0.02
1/4	0.015
1/6	0 010
1/8	0.008
1/10	0.006
1/12	0.005
1/15	0.004
1/30	0.002
1/60	0.001
1/100	0.0006
1/120	0.0005
1/150	0.0004
1/200	0.0003
1/300	0.0002
1/600	0.0001

Popular Measures and Apothecaries' and Metric Equivalents

Popular Measures	Apothecaries' Equivalent	Metric Equivalent
1 drop	1 minim	0.05 cc.
1 teaspoon	1 fluidrachm	4.00 cc.
1 dessertspoon	2 fluidrachms	10.00 cc.
1 tablespoon	4 fluidrachms	15.00 cc.
1 wine-glass	2 fluidounces	50.00 cc.
1 tea cup	4 fluidounces	125.00 cc.
1 tumbler	8 fluidounces	200.00 cc.
1 knifepoint (table-knife)	15 to 30 grains	1.0 to 2.0 Gm.

NUMBER OF DROPS IN A FLUID DRACHM (SIXTY MINIMS OR FOUR CUBIC CENTIMETERS) OF LIQUID PREPARATIONS

"Drop" and "minim" measures are only approximately interchangeable for water and aqueous solutions, not for limpid and viscous liquids. Viscosity, specific gravity and temperature affect the results. The following table lists the drop-minim and cc. equivalents of a number of important drugs and preparations, the majority according to Talbot (Merck's Manual).

Name	Drops in fℨ j (60 M. or 4 cc.)
Aconite, Tincture of	146
Alcohol	146
Alcohol, Dilute	137
Ammonia, Aromatic Spirits of	142
Arsenious Acid, Solution of	75
Arsenite of Potassium, Solution of (Fowler's Solution)	57
Aspidium, Oleoresin of	130
Camphor, Spirit of	143
Castor Oil	77
Chloroform	250
Cod Liver Oil	60
Cod Liver Oil with Viosterol (N.N.R.)	80
Colchicum, Fluidextract of	158
Creosote	122
Croton Oil	104
Digitalis, Tincture of	128
Ergot, Fluidextract of	133

SIZES OF PRESCRIPTIONS AND ORDERS

Quantities of pharmaceutical preparations and products should be limited to minimum requirements of cases. The list below is intended to serve as a guide.

Standard containers are supplied as follows: bottles for fluids, 15, 30, 60, 90, 125, 150, 200, 400, 1000 cc. (½, 1, 2, 3, 4, 6, 8 and 16 ounces and 1 quart.); boxes for capsules, pills and tablets, to hold 12 each of these dosage forms; ointment boxes to hold 10 to 30 Gm. (½ to 1 ℥).

Cough mixtures ..... 120 to 200 cc. (f ℥ 4 to 8)
Capsules ..... 6 to 12
Emulsions ..... 120 to 200 cc. (f ℥ 4 to 8)
Eye lotions ("drops") ..... 15 to 30 cc. (℥ ½ to 1)
Gargles ..... 60 to 150 cc. (f ℥ 2 to 6)
Hand Lotions ..... 125 to 200 cc. (f ℥ 4 to 8)
Injections, hypodermic or intramuscular ..... up to 2 cc. (up to M 30)
Injections, intravenous ..... up to 200 cc. (up to f ℥ 8)
Liniments ..... 200 to 400 cc. (f ℥ 8 to O1)
Narcotics and Barbitals ..... limit to regulations (p. 29)
Nasal instillations ..... 15 to 30 cc. (℥ ½ to 1)
Nasal sprays ..... 125 to 200 cc. (f ℥ 4 to 8)
Ointments ..... 10 to 30 Gm. (℥ ½ to 1)
Pills ..... 6 to 12
Powders ..... 6 to 12
Tablets, hypodermic ..... limit to specific need

RULES FOR DOSES FOR CHILDREN

Clark's Rule: Based on relative weights of child and average adult.

$$\frac{\text{Weight in lbs.}}{150 \text{ lbs.}} \times \text{adult dose} = \text{dose for child.}$$

Young's Rule: Based on age.

$$\frac{\text{Age in yrs.}}{\text{Age in yrs.} + 12} \times \text{adult dose} = \text{dose for child.}$$

PROCEDURES AND DEVICES USED IN PHYSICAL THERAPY

While the procedures and devices used in physical therapy may have considerable value in routine clinical treatment, an outline of the necessary details is not well adapted to this Handbook. For a discussion of the indications, uses and limitations of the methods and devices employed in the various divisions of physical therapy, such as hydrotherapy, gymnastics, massage, corrective exercises, electrotherapy (diathermy, etc.), radiotherapy and heliotherapy, consult the reports of the Council on Physical Therapy of the American Medical Association.

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